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# USSR Report

ENERGY

No. 84

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## ELECTRIC POWER

### PLANS FOR CONSTRUCTION OF HYDROELECTRIC, GEOTHERMAL AND TIDAL POWER STATIONS

Leningrad LENINGRADSKAYA PRAVDA in Russian 4 Sep 81 p 1

[Article by Ye. Bugayenko: "New Electric-Power Stations Are Being Built"]

[Text] The basin of the Kolyma River is one of the most remote and inaccessible regions of our country. Mountain ranges, swamps and thousands of kilometers of taiga cut it off from the "mainland." Rich deposits of mineral resources have been explored and are being developed here. New mines are being built, existing mines and ore-enrichment enterprises are being expanded, while working settlements and young cities are being constructed alongside them. Almost every one of them has its own small thermal electric-power plant. Fuel for them, however, must be hauled in over thousands of kilometers. For this reason, the construction of hydroelectric stations here is advisable.

The construction of the first GES in the Far North was begun on the Kolyma during the 10th Five-Year Plan. The first generating unit of the Kolymskaya GES was put into operation in February 1981.

The work is being carried out under difficult conditions: there is permafrost here, and hard frosts in the winter. The delivery of equipment is difficult. The turbine, for example, had to be brought from Leningrad to Vladivostok on railroad platforms. It was then carried on a specially equipped sea ferry through the Sea of Japan and the Sea of Okhotsk to Magadan. From there it went on special tractor-trailer rigs to Kolyma.

Here, in the taiga, the construction industry has created its own base. The modern settlement of Sinegor'ye has been constructed six kilometers from the GES for the workers and employees.

The construction of the Kolymskaya GES is slated for completion during the current five-year plan. This station is the first in the GES cascade on the Kolyma. GES's are also being built in other regions of the Far East. For example, on the Zeya River, a tributary of the Amur, a GES with an output of 1,290 MW is already in operation. On another tributary of the Amur, the Bureya, an even larger (2,000 MW) GES is under construction.

The problem of supplying consumers with electricity and heat in remote regions can be solved through atomic power. The Bilibinskaya atomic TETs on the Chukotka



delivered its first current in 1974 and reached its designed output of 48 MW in 1976.

On the eve of 1981, the fifth power unit of the Primorskaya GRES in the southern Far East was commissioned. It is based on the large Luchegorsk lignite deposit. The electric transmission lines were run from the GRES to industrial centers and villages in the Khabarovskiy and Primorskiy Krays. The construction of the Primorskaya GRES is slated for completion during the current five-year plan. The first phase of the Neryungrinskaya GRES will enter service in Yakutiya.

Our country is solving the problem of expanding the scale of utilization of renewable resources, geothermal in particular. The first geothermal station in the USSR, the Pauzhetskaya geothermal electric-power station, is in operation on Kamchatka. The second phase of this GeoTES was recently commissioned. Its output is now 11 MW. Of course, this is not much. However, the experience gained in the construction and operation of the Pauzhetskaya geothermal power station will be used in the construction of more powerful geothermal stations.

Here on Kamchatka, in the area of the Mutnovskiy volcano, a large deposit of thermal water has been surveyed. In the opinion of the specialists, this deposit can permit the operation of a 400-MW geothermal power station. The first phase of the Mutnovskaya GeoTES is planned for construction during the current five-year plan. The bore holes run in alongside the Koshelev volcano will provide steam whose temperature reaches 250°. A GeoTES can be built here as well.

Scientists from the Sakhalin Joint Scientific Research Institute have drawn up a large-scale map showing the distribution of underground heat in the Far East. This map will make it possible to develop the reserves of these underground "boiler plants" more systematically and efficiently.

Placing the energy of ocean tides into the service of man is an attractive proposition. Specialists are conducting exploratory operations in the Penzhinskiy Gulf in the Sea of Okhotsk, where tides reach 13.5 m. It is possible to build a tidal electric-power station (PES) here of 100,000-MW capacity. In comparison, we can tell you that the total output of all electric-power stations in the USSR is approximately 270,000 MW. The units of the Penzhinskaya PES (there will be 320 of them) can be assembled on docks, towed to a planned site and submerged to a previously prepared foundation. A dam created by blasting will connect the station with the shore. The floating method of construction has already undergone testing during the construction of the small-scale Kislogubskaya PES in the Barents Sea. This station has received a high evaluation from the experts.

In order to build superpowerful tidal stations on a broad scale, it will be necessary to solve a number of technical problems; in particular, the creation of large-scale hydraulic units and floating modules. In the opinion of the experts, these problems can be solved completely.

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## ELECTRIC POWER

### NEW HYDROELECTRIC STATIONS PLANNED FOR CONSTRUCTION ON YENISEY

Moscow TRUD in Russian 23 Sep 81 p 1

[Article by Yu. Yudin: "The Yenisey Constellation"]

[Text] A resolution has been adopted to create a consolidated construction base in the northern region of the Krasnoyarskiy Kray near the city of Lesosibirsk for the construction of a number of new hydroelectric stations on the Yenisey and its tributaries. The first of these will be the Mid-Yenisey.

Our UAZ truck kicked up a thick cloud of dust from under its wheels for the last time and turned sharply to the side--to that place where, a meter from the verge of the ancient Yenisey highway, a small metal shield had been erected. On it was the laconic inscription: "Line of the Mid-Yenisey Hydroelectric Station." Two dozen steps along the steep grassy slope which had not escaped the withering effects of the early autumn frosts, and we found ourselves on the edge of a 50-meter river escarpment with twisted trees jutting out here and there. This is what the Abalakovskiy section line is like--a place where the dam of the fourth scheduled hydroelectric station on the mighty Siberian river will stand. It derives its name from the taiga village located nearby.

It was apparant that on that day the Yenisey was in a good "working" mood. One would not have believed that on the evening of the day before it drove high, turbid, yellowish waves which tossed our launch from side to side and rushed impetuously to the craggy bank. Now it calmly carried its water along. A silvery "Meteor" rushed along the gently sloping opposite bank. Immediately before us, a tug pulled an immense float of the famous Angara pine downstream. From a high precipice one got a good view of the skeleton cranes on the wharves and the smokestacks of the neighboring city of Lesosibirsk. It is here, at the city's lumber enterprises, that this Angara pine is turned into excellent lumber, loaded onto barges and travels farther north to Igarka, beyond the Arctic Circle. From there it will sail on ocean-going vessels to all points on the globe.

"The first explorations were begun here as early as 1944," explained V. Strichevskiy, chief geologist of the joint survey expedition from the Gidroyekt Institute, which was working along the section line. "More than ten alternatives were studied: up and down along the Yenisey, along the Angara's inflow to the Yenisey and on the Angara itself. We decided to build here. Transportation trunklines are nearby: motor vehicle and railroad. The sites are habitable and the geological conditions are good. Solid bedrock--granite--runs under the river and comes up close to the

surface. This bedrock is a good foundation for the gigantic dam. Moreover, the Yenisey narrows noticeably in this region, and this is also of considerable importance to the hydroelectric-station builders."

It is proposed that the output of the new GES will reach 7.6 million kW. That means that it will be larger than the Sayano-Shushenskaya GES. The 16 generating units of the Mid-Yenisey GES will produce more than 30 billion kWh of electric power annually. Two alternate methods of dam construction are being studied--an earthen dam made of sand and gravel, and a stone-and-rubble dam. The construction of such a dam will be considerably less expensive than a conventional dam.

A canal with locks will be built to allow passage of vessels and floats through the GES. More than 200 settlements fall within the future reservoir's flood zone. A portion of them will be moved to new sites, while others will be protected with special dams. For example, it is proposed that the Gorevskaya lead and zinc-ore deposit be protected by a dam up to 50 meters high. A considerable amount of work also remains to be done in harvesting the lumber from the bottom of the future sea.

The Mid-Yenisey hydroelectric station is the first planned for construction in the GES cascade on the Yenisey and its tributaries. After it will come the turn of the Osinovskaya GES with its output of 6.5 million kW, the Podkamenno-Tunguskaya GES with an output of 2.5 million kW and the Turukhanskaya GES.

"The last will be the largest, its proposed output being 10 million kW," said A. Kuvshinov, chief of the Krasenergo department for future development. "However, this region today has an insufficient construction-industry base for the construction of such hydraulic systems. This is why the decision was made to create a consolidated regional base in the vicinity of Lesosibirsk. It will provide the necessary materials and equipment for the construction of future GES's in this region. The base will include a plant for making precast reinforced concrete and large-scale housing-construction panels, a freight wharf, brick and paving-asphalt plants and many other enterprises. All this will make it possible to carry out the construction of hydraulic systems as if on a factory conveyor belt--using continuous-production industrial methods."

Preliminary calculations show that the creation of such a base will make it possible to save more than 350 million rubles during the course of hydroelectric-station construction and reduce the period of their construction by six years.

It is quiet for the time being on the site of the future base and along the section line, but the first party of construction workers is already making the area here habitable. The foundation has already been laid for the first concrete plant, the compressor room and the warehouse facilities. Laying of the roadbed for the rail spur has already begun.

"The most important thing," said F. Rebrov, chief engineer of the fourth construction board of Krasnoyarskgesstroy, "is that we have begun to put in the water mains in the first microregion of the future settlement of hydraulic engineers. These four microregions of 30,000 inhabitants have soundly built homes and the entire set of social, cultural and domestic enterprises. We will not have stoves and tents. The romance, of course, will remain. How can you get along without it?"



## ELECTRIC POWER

### START-UP OF AZERBAYDZHANSKAYA GRES DESCRIBED

Baku VYSHKA in Russian 2 Oct 81 p 1

[Article by A. Akhmedov: "The Turbine's First Revolutions"]

[Text] The longest day--the last day of September-- also proved to be the happiest for the builders, riggers and operators of the Azerbaydzhanskaya GRES. The turbogenerator began to rotate its shaft, that is, it began idling, at 2300 hours.

This important event, toward which the construction and installation administration of the Azerbaydzhanskaya GRES had been heading since 1975, took place thusly. Hurried preparation for start-up had been underway over the course of several days in accordance with an overall program drawn up in conformance with instructions. After riggers Ye. Kovalev, N. Golovko, V. Mushnikov and others from the Nevinnomyskoye board of the Kavkazenergomontazh Trust installed the last bearing, workers checked for the presence of monitoring and measuring devices, their proper connection, the action of the automatic equipment, the good working order of the technical safeguards, the interlock and the warning-signal system immediately before start-up.

Everything was in working order. Then the chief engineers monitoring the quality of the installation of the primary equipment in the first unit, namely V. Metropyan from the Leningrad Metals Plant and V. Kurnakov from the Leningrad association Elektrosila, as well as GRES chief engineer I. Ashurov, chief of the electrical shop A. Ismaylov and others responsible for this operation signed the log where it said: "Permit engagement of the barring gear in order to check the turbogenerator."

The duty machinist on the power unit, F. Samedov, rotated the control knob on the power panel. It seemed that each person present wished to hear some sort of characteristic noise when the huge shaft, running almost the entire length of the main building, began to move. Standing along both sides of the generator and following the ammeters closely were the operators, building managers, workers from the Mingechaur party gorkom together with First Secretary A. Mamedov, the chairman of the gorispolkom, chief of the building staff V. Guseymov, the chief of Azglavenergo, Chairman of the State Committee M. Imanov, directors of the Azener gostroy and Kavkazenergomontazh trusts R. Gamidov and V. Churbanov and chief of the Construction and Installation Administration A. Agayev. The ammeter needles twitched slightly, moved slowly upwards and, having reached the "50" mark, held

firm. The needles on the instruments were on the same mark. The stability of the results was a sign of the unit's good working order.

The check continued. The group of specialists moved to the modular control panel where there were other instruments showing the rotor's axial movement and the expansion of the cylinders. All the readings conformed with the standards specified in the start-up instructions.

The turbine shaft rotated as required with a speed of three revolutions per minute. Soon, however, when the tests are completed, it will begin rotating at a higher rate of speed. Then the power developed by the first unit in the country's new thermal electric station--the Azerbaydzhanskaya GRES--will be delivered without interruption to the Transcaucasus power system.

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## ELECTRIC POWER

### HIGH VOLTAGE POWER LINE TESTING

#### LEP-1500 Successfully Tested

Moscow PRAVDA in Russian 5 Oct 81 p 3

/Article by M. Glukhovskiy: "Power Bridges Into the Future"7

/Text/ They were awaiting the news on Krasnokazarmennaya Street in Moscow at the All-Union Electrical Equipment Institute imeni V. I. Lenin. And it came, having outstripped by a month the rigid time frame called for by the collective's socialist pledges. In its labor report the specialists of the powerful test stand at the institute's branch in Tol'yatti reported: the testing program at an operating voltage of 1,150 kilovolts of the experimental terminal of an elegas distribution device has been completed successfully. For the first time in Soviet and world practice.

The islets of electric power substations outside cities and industrial centers have become commonplace in the multi-colored drawing of the modern world: the supports with strings of insulators and the bulky, complicated units at the base. The high voltage can be likened to a thundering river, which must be converted into manageable little brooks to be put to practical use. For this reason they build substations, starting with costly equipment.

The cost of transporting and distributing electricity is at times as much as half of the expenditures needed to build electric power stations. And, of course, in performing the role of lead designer for a complex of electrical equipment for the long-distance transmission power lines /LEP/, the institute collective devoted particular attention to their reliability and economicalness.

The sizes of the substations are to a large extent determined by the dimensions of the electrical insulation of the equipment. The scientists used hexafluoride of sulfur - elegas, which is distinctive for its good dielectric parameters and fire and explosion safety - as allies in the project. The cable leadins, the electrical fittings and the pre-assembled busbar systems were enclosed in metal, hermetically sealed and connected compartments, under pressure and filled with gas. Such an assembled distribution device (KRU) requires only half the amount of metal and other materials. It also occupies 20 times less space. The units can also be assembled directly in the plant shops, which sharply reduces the amount of time needed for on

site assembly. The prerequisites are being created to fully automate control. And here is something else that is no less important. The new equipment is safe for the environment; the electric and magnetic fields have been reliably shielded and radio interference has been reduced to zero.

Tests on the elegas KRU, which is rated at 1,500 KV of direct current, will be done next. The use of one such equipment set in a substation of a future high voltage power transmission line will save 720,000 rubles.

On the second story of the All-Union Electrical Equipment Institute there is a museum right next to the party committee. The exposition is opened by a photocopy of a decree of the Council of Labor and Defense concerning the institution in Moscow of a state experimental electrical equipment institute. The date is 5 October 1921. The document is signed by V. I. Lenin. Thus, with the direct participation of Vladimir Il'ich the "brain center" of Soviet electrical equipment industry was created. The institute now bears the name of the leader of the October Revolution.

When participating in the realization of Lenin's GOELRO plan, institute specialists provided for the electrification of the Baku petroleum fields and the mines of the Donetsk Basin, while step by step establishing the scientific foundations for the electrification of industry, transport and agriculture. Inside the walls of the All-Union Electrical Equipment Institute they have developed methods for obtaining ultrashort waves, a system of sound for movies, new gas-charged devices, and mercury valves. The first television broadcasts came from the laboratories of the institute. On the 20th anniversary of Soviet power it was here that they created reliable sources of light for the Kremlin's red stars.

The scientists and electronic engineers are making an important contribution to solving the problems of large-scale power engineering and the formation of the Unified Power System of the USSR. The high-voltage equipment that was designed here is providing reliable service to the 500 - 750 KV alternating current high voltage power transmission lines. Unique converter bridges for transmitting direct current 800 KV power were created here.

In recent times even more powerful equipment is undergoing the stage of final polishing on the testing grounds of Tol'yatti. The equipment is to be used on the long distance LEP from Ekibastuz to Tsentr and Ekibastuz to the Urals.

In accordance with the decisions of the 26th Party Congress the deposits of coal in the Ekibastuz and Kansk-Achinsk basins are to be assimilated on an extensive basis. There is, however, a pressing problem: how to ensure the economical delivery of inexpensive fuel from there to the industrial regions of the Urals and the European portion of the Soviet Union?



Doctor of Technical Sciences and USSR State Prize winner, V. P. Fotin, notes, "If we compare the various methods of transporting energy, then high-voltage power transmission lines possess clear advantages, particularly over long distances. Thousands of trains each year are engaged in transporting Ekibastuz coal. On the Ural Railroad the LEP-1150 alternating current system will free a significant number of the trains for other work. This system is to be put into operation in stages. In cooperation with the institutes of the USSR Academy of Sciences and the power industry workers, especially with the Energoset'proyekt /power system designing/ institute, and workers from other industrial sectors new classes of insulation and contact materials have been created for this line. They have designed relay shielding fittings, automation and communications systems, which are rated for a long service life and maintenance free operation at unusual loads. The originality of the discovered solutions is confirmed by 19 patents, which have been obtained in England, Canada, West Germany, the USA and other nations.

The LEP-1500 will extend from the Irtysh River area to the Volga River over a distance of nearly 2,500 kilometers, ending its path near the city of Tambov. Direct current is preferred for such distances. The transcontinental line with a capacity of 6 million kilowatts will operate as a transit line, transmitting 42 billion kilowatt-hours each year to the central regions. A ton of fuel, extracted in converting it into electricity at the Ekibastuz GRES, will be considerably cheaper in the center of the Soviet Union than if it had been transported in railroad cars as coal. The noticeable time difference in surpassing the load maximum in the regional power systems makes it possible to use the so-called intersystem effect: the national economy will receive for shunting additional capacities, equivalent to several Krasnoyarsk GES's.

The main building of the test stand. The converter bridge of the future mainline transmission line hovers over the framework of the insulators. Here, in Tol'yatti, for the first time in the world they have managed to perform, for some time before the installation, a full-scale test of super powerful high-voltage equipment. They have confirmed the reliability and effectiveness of the designs and circuits that were proposed by Soviet specialists.

Test data prompted a bold idea: increase the size of the power units of the converter substations. At the completion of the 10th Five-Year Plan the institute collective reported that their socialist pledge was fulfilled ahead of schedule (by one year!). Their pledge had been to develop a powerful thyristor, the T-1250, for the LEP-1500 high-voltage power unit.

B. D. Kurnosov, the secretary of the institute's party committee, tells us that "institute departments and its experimental plant and the All-Union Scientific-Research Institute on High Frequency Currents imeni V. P. Vologdin (Leningrad), and the Zaporozh'e Titanium and Magnesium Combine participated in the solution of this complicated task."

The new thyristor replaces three of its predecessors. The use of metal in the converter is decreased by nearly one third.

The Moscow suburbs. Volokolamskoye Highway. Above the edge of an autumn forest one can already clearly see the features of the Istrinskiy high voltage testing center that is under construction. When it is completed, the 31-story CEEMA building on Prospekt Kalinina in Moscow will fit beneath the gigantic cupola of the new center. The building will be 118 meters in height and have a floor space of nearly 40,000 square meters. The size of the problem to be solved here is also considerable.

The river beds of rivers of electricity for the future. In accordance with the target scientific-technical comprehensive program, which was confirmed by the USSR State Committee for Science and Technology and the USSR Gosplan, tests have been started to create direct current equipment for a direct current power transmission line from the Kansk-Achinsk power complex to the center of the USSR. Estimates indicate that the line will be able to transmit up to 70 billion kilowatt-hours of electricity. To do this it will be necessary to raise the voltage to 3 million volts!

Specialists believe that in the future it will be possible to create an alternating current LEP of up to 2 or 3 million volts and a direct current LEP of up to 5 million volts. Such are the scientific forecasts. They need to be confirmed, proven or rejected. An experimental base is needed to do this.

"Attention: charge!", sounds the voice of engineer A. V. Luneyko calmly. And although there is not a cloud in the sky, like a shot, there is thunder and our eyes are blinded by a fiery shot. On the open platform of the Istrinskiy department of the All-Union Electrical Equipment Institute they are testing the equipment of tomorrow.

For centuries lightning and thunder scared people. Today man-made lightning is helping man to withstand the elements and to build a new life.

#### Ekibastuz-Ural LEP Construction Report

Moscow PRAVDA in Russian 3 Oct 81 p 1

/Article: "The Masts Move Forward"/

/Text/ Through forests and across rivers and the endless virgin land fields the might steel supports of the Ekibastuz-Ural LEP1150 move forward. The world has never seen the likes of the super high voltage power lines that extend over such great distances. The first section of the new LEP will be operational during this five-year plan. The construction of line has been entrusted to the Spetsset'sstroy /special power system construction/ trust of the USSR Ministry of Power and Electrification. Work is in progress on several sections between Ekibastuz and Kokchetav.

We accompanied the director of the Ekibastuz electric power conversion complex of the production association Dal'elektroperedacha /long-distance electric power transmission<sup>7</sup>, V. Tim, on a visit to the line, where the mechanized column No 36, the trust's leading subelement, is working. The general customer and future operator of the line, Vasiliy Korneyevich Tim, is satisfied with the quality of the work. The builders and electrical equipment installers have a good understanding of the importance of this key project and are therefore working with spirit. As recently as April they installed the first silvery support in their section; now there are nearly 150 of the open-work masts, marching in a line and following the relief of the terrain.

The kilometers of the new LEP are not easily won. In order to prepare the foundations for installing the supports, the builders often must use explosives to loosen the rock. The pace of work is also slowed by ground waters, which are near the surface in these places. But nothing stops the builders. N. Churikov's brigade, which is pouring the foundations, is constantly overfulfilling the norms and staying considerably ahead of schedule.

Following the foundation builders come the brigades which assemble the intermediate and anchor supports. A. Krovyakov's brigade is doing an especially good job here. One can only admire how smoothly and well the assemblers work. Their job is labor intensive and laborious. After all to assemble a metal support that weighs 20 tons, it is necessary to install nearly 3,000 bolts alone.

There is not a single lagging collective on the entire line. The brigade contract method that is being used helps to make this so. And the veterans take care of the young workers. For example, a lot can be learned from the leader of installers' brigade, V. Umnov, who worked on the construction of the LEP-500 from Kostroma to Vologda, Toktogul to Frunze. On this new line Umnov is performing the most intricate task - he is in charge of installing the 46-meter supports. His skill and high responsibility enable the brigade to install two supports per day instead of one per day, which is the norm.

#### Laboratory Report on LEP Designs

Leningrad LENINGRADSKAYA PRAVDA in Russian 12 Sep 81 p 2

/Article by S. Satayeva: "In the Laboratories of the Scientists: The Energy of High Voltages"<sup>7</sup>

/Text<sup>7</sup> The high-voltage building of the Leningrad Polytechnical Institute is the "captain's bridge" of the facility for testing the electric power transmission lines. From the windows there is a good view of the portals which are part of the 750,000 volt electric power transmission line, that has already been assimilated in Soviet power engineering. Its unusual design is cause for amazement: between the two portals is suspended a phase - a cluster of 16 wires,



which are "girdled" by two bands with a four meter diameter. Three such phases will be used in the future in a voltage up to 1800 KV.

In the 11th Five-Year Plan the first 1150 KV power line will extend for a distance of more than 1,000 kilometers, from Ekibastuz to Chelyabinsk. The second such line will go from Surgut to Sverdlovsk. A third will be built later and will connect Chelyabinsk with Itat. These power lines will carry electric power from the thermal electric power stations of the Ekibastuz and Kansk-Achinsk basins to the European section of the Soviet Union.

G. N. Aleksandrov, the prorektor of the institute's science department and a doctor of technical sciences, says, "It seems only recently that the creation of 500 KV power lines was a big achievement. There is even a song on the "LEP-500". But today my colleagues and I from the Energoset'proyekt feel that power lines with a voltage up to 2000 KV can be built. Our laboratory base makes it possible to test them."

At the northwest division of the institute Energoset'proyekt, a model of a new, promising power line is on display. In comparison with traditional lines, it looks unreal. Three phases - three bands with wires, the smaller in the larger, present a unified design. The supports for the lines are also unusual. They are in the form of a tripod, of the guy-rope type. The unusualness of the forms is caused by a desire of the scientists and specialists to achieve a reduction in the use of materials and especially metal. They are light-weight, which is especially important in northern regions.

The chief engineer of the institute's division, I.M. Nosov, tells us that "the distance from housing, the lack of good roads means that the work is done from three to four months out of the year and only in the winter time. These are some of the things that the builders of the line have to contend with on the Belozerskaya to Surgut section. We are wondering how we can speed up construction in unfavorable conditions."

Many new designs are already being tested. For example, the tripod-support recently passed its test successfully in Irkutsk and has been recommended for production. It has many advantages. It is stable. It can be transported by helicopter in a vertical position: it stands in one position and lifts from the ground using a rotary-wing aircraft and is put on another on the path of the power line. We are studying a variant of surface foundations, which are fastened to it: the tripod-support when joined to the foundations eliminates the need for ground and welding work and will make it possible to build lines at any time of the year.

A promising trend is the construction using light-weight designs that are fully prepared at the plant. The substation is broken down into units weighing 10 tons each, then transported by helicopter to the place where they are joined together - this is not a bad idea. But a helicopter can only transport one unit, and hundreds of units need to be transported. The costs are great and a lot of time is wasted. And



a reliable brigade is needed to do the installation work. All of this has put the institute specialists to thinking that the units could be joined together in plant conditions into one unit and then transported by dirigible, which is capable of carrying almost to any altitude a 500-ton object.

There is one more new problem, which is of concern to both power engineers and ecologists. It is well known that a strong electrical field is formed on ultra-high voltage power lines. This field interferes with the migration of wildlife and birds. To avoid violating the laws of nature it is necessary to raise the wires of the power lines. But this will increase their cost. It can be done in such a way that nature herself will protect itself.

Research performed by the scientists of the polytechnical institute and the Timber Equipment Academy have shown: green planting beneath the power lines substantially decreases the electrical field. In a large massif it is practically non-existent. This means that it is not necessary to strip the path of the power line, but to plant it with low-growing trees. This means that it is not necessary to increase the height of the supports.

But another new problem arises. To plant trees requires working hands. And quite a lot of them! There is a solution. Scientists propose that on the migration paths either trees be planted or that so-called "windows" be made, by suspending the wires on higher supports.

The large number of developments of the two cooperating institutes - the Polytechnical Institute and Energoset'proyekt - is being used in the construction of electric power transmission lines in the Soviet Union even today. And they have been patented in various countries.

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CSO: 1822/24

## ELECTRIC POWER

### ALTAY WATERS MAJOR REGIONAL POWER SOURCE

[Editorial Report] Alma-Ata SOTSIALISTIK QAZAQSTAN in Kazakh 1 September 1981 carries on page 1 an 1,000-word article by M. Maghzumov on the history, present state and future of Altay hydro-electric power. Maghzumov notes that about 13 percent of republic water resources and 38 percent of its hydro-electric generating capacity are in the Altay. He traces the history of hydro-electric generation there from plans drafted by Lenin himself, through the construction of the Oskemen (begun in 1938 and completed in 1951-52) and Buqtyrma (begun in 1953 and completed between 1960-1966) stations on the Ertis, the latter the largest hydro-electric plant in the KaSSR with a 675,000 kilowatt capacity which provides power to a whole region, down to more recent projects that made possible the electrification of the last unelectrified rural farmsteads in 1980. Moreover, additional expansion is now planned including a major facility at Shul'ba on the Ertis, the first section of which will be operational by 1985, another facility at Semey, to be begun during the same period, and new transmission lines. Altogether about 10 new state hydro-electric stations are now planned.

There are now a total of 38 hydro-electrical stations operating in the KaSSR along the Ertis with a total capacity of more than 7,000,000 kilowatts. The Altay alone produces three times as much electricity today as all of Russia before the revolution. The KaSSR ranks third in the USSR in total hydro-electric generating capacity. Associated with Altay hydro-electrical facilities are many large reservoirs serving agricultural as well as hydro-electrical purposes. Some of the reservoirs also support shipping.

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## ELECTRIC POWER

### BRIEFS

NEW POWER UNIT AT AZERBAIJAN GRES--The installation of the basic equipment of the first 300,000 kilowatt power unit, which is being built at the Azerbaijan GRES, has been completed. This thermal electric power station, the largest in the Caucasus area, will be outfitted with four such units. When they are put on line, Azerbaijan will be able to fully meet its power needs. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 81 p 37 8927

WORK AT VILNIUS TETS-3--The first stone has been put into place in the foundation of the main building of the Vilnius TETS-3. The construction of the new TETS is an important point in realizing the program for the development of Lithuania's power industry. The production of electric power in the Lithuanian SSR will increase during this five-year plan by 2-fold. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian, No 39, Sep 81 p 37 8927

FOURTH UNIT ON LINE AT LENINGRAD AES--The collective of the Leningrad atomic electric power station has assimilated the rated capacity of the last and fourth power unit two months ahead of the projected socialist pledges. The capacity of the electric power station has reached 4 million kilowatts. Since the beginning of the year, the Leningrad AES has produced more than 650 million kilowatt-hours of electricity in excess of the plan. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 81 p 37 8927

SECOND POWER UNIT AT GAZALKENTSKAYA GES--The second power unit of the Gazalkentskaya GES has been put into operation by nearly one month ahead of schedule. /Text/ /Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 81 p 37 8927

FIRST POWER UNIT AT AZERBAIJAN GRES--Each hour brings us closer to the start-up of the first power unit at the construction site of the Azerbaijan GRES. On the night of 28-29 September energy was fed into the ORU -open separating device - from the line of the Zakavkasskaya power system. The operation is very important and it was executed according to a specially compiled program. It is enough to say that it was necessary to disengage the high-voltage power line between Mingechaur and Akstafa and to shut down the generator of the Mingechaurskaya GES so that later, having started it again, the voltage could be increased from 0 to 330 kilovolts. When the voltage reached the required mark,

they began checking all devices, wires, busbars, phases and so forth. At night the control post began receiving reports on the normal operation of all mechanisms and devices. The feed of voltage into the ORU is not the final goal. It is needed to further prepare the mechanisms for the start-up of one of the basic mechanisms of the first power unit - the generator. Yesterday the final operations were completed in the main building. The brigade of Hero of Socialist Labor Yu. Torovtsev prepared the turbine for shaft turning. The turbine began operating at idle. To meet the established time frame, the installers from the Nevinnomysskiy administration of the Kavkazenergomontazh trust, Ye. Kovalev, V. Mushnikov, M. Korepanov and others worked from 15 to 17 hours each. Yesterday the electrowelder made the final connection on the gas line, which feeds fuel into the boiler. The chemical-water cleaning shop, which provides start-up operations with desalinated water, ammonia and other reagents worked at full capacity. The unit's pumping station operates flawlessly. The station was built on the Verkhne-Karabakhskiy canal. Two pumps of 19,000 cubic meter capacities each feed water into the turbine's cooling condensor. Yesterday from the ORU energy entered the reserve transformer. All pumps are fed from this transformer. The pumps operate for the boiler. A. Aliyev's brigade has completed the preparation of the boiler for firing. For the first time the boiler will burn gas. But there is also a reserve fuel - fuel oil /mazut/. All work was recently completed on the fuel oil storage facility. The mechanisms are operating flawlessly. /Text/ /Baku VYSHKA in Russian 1 Oct 81 p 17 8927

TURUKHANSKAYA GES--Specialists from the Leningrad division of the institute Gidroproyekt imeni S. Ya. Zhuk are completing work on the technicaleconomic justification for the Turukhanskaya GES. It will be located on the Nizhnyaya Tunguska River east of the city of Turukhansk. The deputy chief engineer of the institute and merited builder of the RSFSR, A. Vasil'yev noted, "According to preliminary estimates the capacity of the future power station will be 20 million kilowatts. At present our co-workers are carrying out an extensive plan of scientific research. They must solve several key problems. The construction will, after all, be done in a permafrost region. /Text/ /Moscow IZVESTIYA in Russian 3 Oct 81 p 17 8927

USE OF CONCRETE FOR POWER LINE SUPPORTS--The construction of high-voltage power lines will be significantly hastened by the use of reinforced concrete corner supports. The production of these supports has commenced at the Stry plant of metal and reinforced concrete structures in L'vov Oblast. The first large batch of these supports has been sent for use on electric power transmission lines in Western Siberia. /Text/ /Kiev PRAVDA UKRAINY 22 Sep 81 p 17 8927

TWO-SPEED GENERATOR--Specialists from the Elektrosila association call the hydrogenerator that was created for the Shul'binskaya GES a two-speed generator. Its construction began in Irtysh not far from Semipalatinsk. Yesterday in the scientific-research institute of the enterprise they completed the design work of all of the basic units of this machine. P. N. Frolov, the chief of the sector of the institute, said, "the new hydro electric power station in the Kazakh SSR will be



put into operation in two stages. It is interesting to note that in the early stage the potential of each unit will be 130,000 kilovolt-amperes. It will then be nearly doubled - to 250,000 kilovolt-amperes. This will take place in connection with the filling of the reservoir. Such a sharp increase in parameters will not require new equipment. It is planned to only replace several units directly at the power station. The Elektrosila workers must manufacture six sets of such shunting generators, the efficiency of which will be equal to the best models in the world. /Text/ /Leningrad LENINGRADSKAYA PRAVDA in Russian 18 Sep 81 p 1/ 8927

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## ENERGY CONSERVATION

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### FUEL CONSERVATION MEASURES AT COAL INDUSTRY ENTERPRISES OUTLINED

Moscow UGOL' in Russian No 8, Aug 81 pp 20-21

[Article by Candidates of Technical Sciences V. M. Kravchenko (TsNIEIugol'), G. N. Utenkova; Doctor of Technical Sciences V. M. Ivanov (IGI): "Conservation of Fuel and Heat at Enterprises of the Coal Industry"]

[Text] The General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev in the report to the 26th CPSU Congress set the task of more efficient use of the country's production potential, and all-possible saving of all types of energy resources.

The coal industry is making a great contribution to solving this task. It is a major consumer of fuel and heat. During the 10th Five-Year Plan, the branch enterprises conserved 315,000 [tons] of conventional fuel and 7.71 million GJ of heat. The fuel consumption standards for the production of the main types of products were diminished by 4-8%. Further work will be done in the 11th Five-Year Plan in the coal industry to conserve fuel and energy resources.

Questions of conserving fuel and heat at the coal industry enterprises have been covered in the All-Union Scientific and Technical Seminar which was held in May 1980 in Shakhta of the Rostovskaya Oblast. The seminar discussed a broad circle of questions, and, in particular, those such as the method of burning coal in furnaces with a fluidized bed, the use of shaft methane, transfer of DKVR type boilers to a water-heating regime, burning of granulated coal in industrial boiler houses, the leading methods and means of conserving fuel and heat which can be employed in individual associations.

A number of the seminar's recommendations are currently being introduced at the branch enterprises. In the association "Intaugol'" the total saving of heat in 1980 for the normed product was about 86,500 GJ, and for the consumption of boiler fuel--1644 T of conventional fuel, or 3.6% of the normal consumption. The association has developed organizational and technical measures for 1981 to guarantee fulfillment of the assignment to save about 840,000 GJ of heat and 2,800 T of conventional fuel in the mines, plants and other production units.

It was noted at the seminar that the replacement of obsolete power equipment with modern, with improved technical and economic indicators, is of primary importance at many enterprises of the coal industry. For this purpose, the association "Intaugol'" decided to replace three small heating boiler houses with one large one with

mechanized fuel supply and slag removal whose construction is planned to begin this year. A plan has been formulated for heat supply to the Zapadnyy settlement from the Inta TETs with laying of a heat pipe extending 3.5 km. As a result of these measures, about 42 GJ/h of heat will be conserved.

The outdated equipment has already been replaced at the mines "Shebunino" of the association "Sakhalinugol'," "Gorskaya" of the association "Pervomayskugol'," "Sokolovskaya," imeni gazeta KOMSOMOL'SKAYA PRAVDA, imeni S. M. Kirov of the association "Rostovugol'," at all mines of the association "Vorkutaugol'" and at the enterprises of the association "Vostsibugol'."

The recommendation of the seminar to use hot water as a heat carrier instead of saturated steam is being introduced in the association "Intaugol'." The first phase has been put into operation of the largest regional communal boiler house with output of 168 GJ/h. The output power of the entire boiler house will be 370 GJ/h exclusively in overheated water (the steam is only used for internal consumption of the boiler house). The second boiler house in output at the "Zapadnaya" mine currently supplies over 75% of the heat to the consumer in the form of overheated water, and when the heat route TETs-Zapadnyy starts up, it will completely switch to this type of heat supply.

The use of hot water as the heat carrier instead of saturated steam is already being implemented and will be introduced at other enterprises of the branch as well: at the mines "Vorgashorskaya" and "Komsomol'skaya" of the association "Vorkutaugol'," in the mine administration "Yegorshinskoye" of the association "Vakhrushevugol'." At the "Rodina" mine of the association "Pervomayskugol'" the introduction of this measure yielded an economic effect of 3,000 R, at the mine "Leningradskaya" of the association "Leningradslanets" it yielded 5,000 R, and in the mine administration imeni Frunze of the association "Roven'kiantratsit" it yielded 2,000 rubles. It is planned in 1981 to transfer DKVR type boilers from steam to hot water in the mine administration "Gornyatskoye" of the association "Rostovugol'."

The transfer of the steam boilers to the water-heating regime is being done at the mines of the associations "Sakhalinugol'," "Stakhanovugol'," (mines "Bazhanovskaya," "Luganskaya," imeni Dzerzhinskiy, and "Annenskaya"), "Severokuzbassugol'," "Vakhrushevugol'," "Roven'kiantratsit." In the association "Rostovugol'" in 1980, 16 of the Lancashire boilers were switched to water-heating regime. In the association "Intaugol'," the boiler houses and dryers make extensive use of low-grade fuel. The fuel consumption in 1980 was thus 100.4 T of conventional fuel in the boiler houses of the mines "Zapadnaya" and "Vostochnaya" and in the regional boiler house of Inta.

The use of low-grade fuel in the mine administration imeni Frunze of the association "Roven'kiantratsit" yielded an economic effect of 10,000 rubles.

Measures have been taken at the mines "Glubokaya," "Yuzhnaya," and "Vostochnaya," in the mine administration "Gornyatskoye" of the association "Rostovugol'" to improve the efficiency of the boilers through a more effective burning of fuel, improvement in the fly ash return, decrease in the percentage of unorganized feed of air into the boilers, etc.

The association "Intaugol'" has reconstructed the DKVR boilers according to plans without installation of two-rows of valves and with the installation of them. As a result, the DKVR-6.5/13 boilers which were reconstructed according to the first plan, guarantee stable steam production of 8-9 T/h with somewhat higher efficiency.

It was recommended at the seminar that the temperature of the air fed into the mine be automatically regulated. This measure is currently being implemented at a number of mines in the association "Intaugol'," at the heater units of the mine "Ayutinskaya," "Yuzhnaya," and "Yubileynaya" of the association "Rostovugol'," and at all mines of the association "Vorkutaugol'."

Transfer of the boilers to the combustion method in a fluidized bed acquires great importance. The introduction of this method at the mine "Mikhaylovskaya" provided a saving of R 6,000. A program has been developed to transfer the boilers from the layer to the method of burning in the fluidized bed in the associations "Gukovugol'," "Severokuzbassugol'," and "Roven'kiantratsit." In the association "Rostovugol'" it is planned to reconstruct the burners of two boilers in 1981 to burn fuel in a semifluidized bed. A number of other associations have made the transition of boilers to this method.

Improvement in the methods of using the mine methane, as well as searches for ways to further improve its application have urgent importance.

The IGI [Institute of Mineral Fuels] has conducted studies to burn methane-air mixtures with different methane concentration together with solid fuel. Based on the research of the planning and design office of the trust "Donetskugleavtomatika" the initial data were issued for the development of versions of joint combustion of coal and methane in the mine boiler houses. The planning and design office of the trust presented the technological documents to convert the boilers to joint combustion of mine methane with coal by two methods: burning of a methane-air mixture with methane concentration of 30% and coal when the mixture is added to the burner above the solid fuel layer; burning of the methane-air mixture with methane concentration in it of 2.5% when the mixture is fed in the form of a methane-air jet under the grating of the steam generator.

Studies were also conducted in order to develop a method of enriching the unconditioned mine methane (with content of less than 30%) by the method of short-cycle heat-less adsorption (KBA method). Based on these developments, the IGI issued the initial data to design a unit to prepare methane of unconditioned composition through its enrichment for subsequent use as fuel in the boilers of the mine imeni V. M. Bazhanov of the association "Makeyevugol'." The study results were the basis for the technical assignment to the Central Asian department of the VNIPIenergoprom [All-Union Scientific Research and Planning Institute of the Power Engineering Industry] to develop the technical and economic substantiation of a system to collect the captured methane in the mines of the association "Karagandaugol'" and recover it in the coal-dust burning of coal in the boilers at the TETs-3 "Karagandaenergo." It is planned to introduce these methods in the mines "Zapereval'naya" and "Oktyabr'skaya" of the association "Donetskugol',"

The method of enriching the mine methane (KBA method) and its subsequent use in the mixture for the boilers is suggested for the mine imeni V. M. Bazhanov of the association "Makeyevugol'" in the DKVR-10/13 boilers.

According to the assessments of the economic effectiveness, introducing the methods developed by the IGI for burning methane with coal will guarantee an annual economic effect per one unit at the mines: "Zapereval'naya"--R 98,000, "Oktyabr'skaya"--61,700, imeni V. M. Bazhanov--R 67,000. According to the data of technical and economic substantiation, realization of the method at the enterprises "Karagandaugol'" and "Karagandaenergo" will yield an economic effect of 1.2-1.5 million rubles per year.



Nine boiler houses were switched to combustion of mine methane at the branch enterprises in the 10th Five-Year Plan. This saved 629,100 rubles per year.

One of the methods of preparing to recover the methane of unconditioned composition from the coal beds is its preliminary enrichment, bringing the methane concentration in the gas mixture to 30% and more according to the method developed by Donetsk Polytechnical Institute.

The introduction of the recommendations of the All-Union Scientific and Technical Seminar at the coal industry enterprises is continuing.

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## ENERGY CONSERVATION

### ENERGY CONSERVATION MEASURES PLANNED FOR TAJIK SSR

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 27 Sep 81 p 2

[Article by B. Yunusov, candidate of economic sciences: "Strict Accounting for Fuel and Energy"]

[Text] According to the decree of the CPSU Central Committee and the USSR Council of Ministers on economy, in the 11th Five-Year Plan the country needs to conserve 160-170 million T of conventional fuel. This averages 32 million T per year, 7 million more than in the last five-year plan. For Tajikistan, the approximate saving of fuel and energy resources during the five-year plan will be about 1.2 million T, and the economic effect will be about 50 million rubles.

It is common knowledge that the energy complex is currently reaching giant scales. Only 1% saving equals 20 million T of fuel. This is equivalent to R 2 billion. It has been computed that the outlays for measures to save fuel are 2-3-fold lower than to increase extraction and its shipment to the consumers. This is why it is so important to use all the potentialities for reducing losses and for efficient consumption of energy resources.

The main causes of the low coefficient of fuel use are the insufficiently high level of the technological processes to convert it, transport and use it, imperfection of the employed equipment, weak introduction of instruments and means of controlling and regulating the consumption of fuel and energy.

The specific consumption of fuel and energy for the production of individual types of products at many enterprises of the republic is thus unjustifiably high because of the shortcomings in norming and accounting for consumption, and for a number of other reasons.

The losses of energy resources are impermissibly high in the residential-communal services. The consumption of hot water per resident is considerable. The conclusion is immediately drawn that programmed regulation of the heat output should be introduced, the more so since the necessary devices are already available.

A considerable saving of fuel can be obtained by reducing the consumption of fuel to produce electricity and heat. We have made definite advances in this area. Whereas on the whole for the country, the specific consumption of fuel must be

reduced from 328 grams per kilowatt-hour in 1980 to 312 grams in 1985, for Tadzhikglavenergo this consumption was already 217 grams last year.

One of the primary measures must be a drastic increase in the volumes of use of the fuel sources, and especially the secondary energy resources. Work in this direction is still insufficient in our republic.

There are considerable reserves of saving in automobile transportation, agriculture and aviation. The transfer of automobile transportation, primarily trucks, to diesel fuel will save up to 30% of the light petroleum products. Transportation work by tractors in agriculture has to be curtailed by increasing shipping by diesel trucks. On the whole, a higher level of operation of the truck fleet by improving the organization of shipments and its efficient use, as well as improvement in the road condition will decrease fuel consumption in the five-year plan by roughly 10%.

The Institute of Economics of the Tajik SSR Gosplan, with the participation of the ministries and departments of the republic have developed recommendations to save fuel and energy resources in the sectors in a territorial cross-section and measures to realize them. The saving is computed in the following chief spheres of the national economy: industry, construction, residential-communal, agriculture, including land reclamation and water management, and automobile transportation.

At the Vakhsh nitrogen fertilizer plant, for example, the conservation is mainly planned through technical re-equipping and reconstruction. The current plant equipment is physically worn-out and obsolete which results in overconsumption of energy. The Tajik aluminum plant counts on obtaining the main saving through the use of secondary energy resources. When the enterprise starts up on the rated power, the specific standards of consumption of electricity per unit of product will be diminished. It is planned to reach 100 million kw-h of annual saving by the end of the five-year plan in the Tadzhikglavenergo enterprises by curtailing losses in the electric circuits, conversion and increase in voltage, and reduction in the radius of the power transmission lines.

The Ministry of Communal Services has worked out measures on economy with consideration for improvement in the operating conditions, reliable heat supply to the cities, reduction in labor outlays, conservation of working time and protection of the air basin. The introduction of so-called low-outlay measures which include a schedule for cleaning the heating surfaces and constant control over the condition of the boiler lining will make it possible to conserve over 170 million kw-h of electricity, almost 20,000 gigacalories of heat and 5,000 T of comparison fuel in 1985.

The Ministry of Communal Services has 270 kilometers of heat networks, and 80% of them have already been operating over 20 years. This is the cause of large losses of heat, fuel and electricity, interruptions and troubles in the heat supply. Annual relaying of 14 kilometers of heat networks has been stipulated for several years already. However, this plan has not even been fulfilled by half. Now the trust "Inzhdorremstroy" has been set up. It has been given all the repair work of the heat networks and their reconstruction. This will undoubtedly have a favorable effect on the economical consumption of fuel.

The chief and most effective measure for conservation in the system of the Ministry of Land Reclamation and Water Resources is reconstruction and improvement in the efficiency of the machine irrigation systems. Irrigation is mainly done by the open method now. This results in overconsumption of water because of evaporation and soaking into the soil. The pumping stations consequently are running with a great load. It is planned to systematically reconstruct the irrigation system in the 11th Five-Year Plan. This will save 70,000 T of conventional fuel in 1985.

An important measure for conservation is the introduction in agriculture of instruments of metering and control. Electricity is currently paid for here according to the rated output. This does not encourage the consumer to save energy. The introduction of control and metering will normalize the payment system. Realization of this measure will annually save about 12 million kw-h of electricity.

The Ministry of the Fruit and Vegetable Industry has searched for definite reserves. Measures have been planned to eliminate losses of heat in the heating ducts of the cannery and in the greenhouses of the association "Tobiston." The sovkhoses, industrial enterprises and trade organizations that are subordinate to the ministry now only have 25% of the instruments for metering consumed electricity. The unit which is in short supply will make it possible to save 1,600 T of fuel, or 5 million kw-h of electricity.

Measures to conserve light petroleum products and diesel fuel have been worked out by the ministries of automobile transportation, construction and operation of roads. Introduction of specialized comprehensively mechanized sections for technical maintenance and repair of automobiles and trailers, increase in the freight capacity of transportation, its conversion to diesel fuel, and the maximum reduction in the use of light-weight service trucks are planned. These and other measures will provide up to 20% of the saving of light petroleum products.

According to the decree, a list of the main measures to improve the efficient use of fuel and energy will be presented at the same time as the drafts of the annual plans. These materials were requested even this year. However, many enterprises and organizations of the republic have fulfilled the assignment on a low level, and some of the departments have reported that they cannot give anything at all. Analysis of the materials shows that drawing up of the accountability documents, formulation of standards of consumption of fuel and energy resources, as well as measures to conserve them and for their efficient use at the enterprises, ministries and departments are often entrusted to colleagues who are not sufficiently trained and are incompetent.

These questions must be under constant control of the interdepartmental agency, the republic commission for conservation and creation of reserves of fuel and energy resources of the Tajik SSR Council of Ministers. Technical and economic substantiation of the efficiency of the presented measures, as well as the development of new ones require a joint search of the planning agencies, ministries and departments of the republic.

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## ENERGY CONSERVATION

### STRICTER ACCOUNTING IN USE OF ELECTRIC POWER

Yerevan KOMMUNIST in Russian 23 Sep 81 p 2

/Article by L. Kuloyan, chairman of the department of industrial thermal power and thermal electric power stations of the YerPI /Yerevan Polytechnical Institute/ and professor: "Strict Accounting of Power Resources: For an Economical Economy"/

/Text/ The struggle for the conservation of fuel and power resources is essentially a struggle against all losses accompanying the use of fuel and energy in all levels of the national economy.

The coefficient of the use of fuel oil /mazut/ in heat supply systems is on the order of 20 to 40 percent. This means a loss of 60 to 80 percent of the chemical energy that is delivered to the Armenian republic with great difficulty in the form of fuel oil. But is heat generated with an efficiency of 70 to 90 percent in the fuel oil burning boilers? And how much fuel is being lost prior to combustion and during the distribution and use of thermal energy?

According to the relative fuel outlays for the production of electric power Armenian thermal electric power stations have satisfactory indicators. And this is understandable. There is basic production for them in the generation and output of electric power and heat. A steadfast battle is being waged in behalf of conservation in the Armenian SSR. This battle is reinforced with incentives and it is rather well organized. However, there are hidden reserves: following the scheduled modernization of power units and the replacement of outdated equipment and also by more fully using the thermal capacity of a power station, one can obtain a significant reduction in the relative expenditures of fuel.

The situation with the heat supply system for housing and municipal facilities is not satisfactory. The incomplete use of the thermal capacity of the operating large regional boilers of Yerevan is cause for alarm. Due to the lack of thermal networks even during the winter time only 25 to 30 percent of the capacities of the Norkskaya and 10 to 15 percent of the Avanskaya boilers is being realized.

The problem is that this progressive method requires a higher, technical quality in operation, and also planning and equipping, than, for example, the heating of homes.

Thus, the unsatisfactory operation of the Norkskaya regional boiler or the poor reliability of the operation of the thermal networks, which was caused by intensive corrosion, can be explained by the poor quality standard of their rigging and operation. When there is a centralized heating supply system the distribution and regulation of the produced heat between consumers requires knowledge and experience. But in practice these functions are performed by carpenters "by eye" and by the residents themselves. For this reason there is nothing to say about the quality and reliability of the heating system.

Due to errors committed during construction and installation work and the lack of the required control of the operation of the heating systems in some buildings, the systems heat poorly and permit losses which are at times significant. In some cases hot water is permitted to escape from the attic facility directly to the outside.

The situation in industrial power is not fully satisfactory. It is thought that in this case the main reason is that the thermal power management of the enterprises is continuing to be considered as an auxiliary system. How can one judge the conservation or excessive burning of fuel, if the enterprises do not always have the necessary measuring devices and the thermal power equipment is not subjected to periodic tests.

Information concerning the expenditure of fuel and energy is not reliable, particularly in those cases when the standards for relative expenditures are not sound, are outdated, and do not reflect the regional conditions and the state of the equipment.

Frequently a visual examination will reveal the unfavorable condition of the power system - the irrational and incomplete use of heat, steam and the discharge of condensate, frequently mixed with steam and discharged into the sewage system, and the pollution of the environment with high-temperature gases.

Usually in places where inadequate attention is given to questions concerning improving the operation of the thermal electric power system and the conservation of thermal resources, there is a total lack of concern about the city and the purity of the air and the need to conserve water resources. In such conditions can one give serious thought to the use of recycled energy resources /VER/?

Of course, there are objective reasons for all of this, some of which are quite serious. Outdated equipment and the lack of the needed devices, fittings, the poor quality of such things, and unsatisfactory material and technical supply are some of these reasons. To eliminate these reasons it is necessary to realize first of all a well-thought out set of measures to establish order in the management of the thermal power supply systems.

The selection of an expedient schematic of such management is important for the municipal power system of large cities, and especially for the city of Yerevan, where in connection with the development of a centralized heat supply system the separateness of the operation of

of individual links of this system significantly reduces the efficiency of the system.

Although the lion's share of the boiler and furnace fuel, which is transported into the republic, is used in industry, the control over its rational use, as in general questions dealing with the management of the thermal power system of the enterprises, is maintained not by a unified competent organ, but basically by higher-ranking branch organs, several of which are not at the republic level.

Overcoming the departmental separateness, primarily for purposes of protecting the environment and making rational use of natural resources, will be the first and important step in coordinating the management of the industrial power industry within the Armenian SSR.

Of course, all of these organizational measures will be most effective if the development of all industrial and particularly municipal heating supply systems is based upon well-thought out and periodically adjusted general plans of the cities which incorporate in a mandatory manner questions having to do with the development of their fuel and energy complexes.

It is thought that the need is ripe for the creation of an effective system of incentive and restrictive measures, which would stimulate a truly governmental approach to questions regarding the improvement of the thermal power system and the economical use of energy resources. The presently existing system is not up to the job and is incapable of overcoming the "traditions" and psychological barriers.

Many questions need to be resolved through research, design work and the selection of optimal variants. Several errors in the development of the Armenian power supply system were permitted out of ignorance of this important stage, when research is replaced by standard or arbitrary solutions after taking into consideration all regional factors.

To compile a sound power program and, no less important, to ensure that such a program is successfully implemented it is necessary to establish order in the organization and management of all links in the power supply system. It is also necessary to mobilize a power-oriented public awareness, while heading and coordinating the needed scientific-technical design work and research within the framework of individual comprehensive target programs. This is the only way that one of today's most pressing tasks can be resolved.

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## ENERGY CONSERVATION

### HOW KEMEROVSKAYA OBLAST SAVES ENERGY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Aug 81 p 2

/Article by L. Gorshkov, first secretary of the Kemerovskaya Oblast Party Committee: "Strict Accounting of Fuel and Energy: Conservation is Everybody's Business"7

/Text7 At the 26th Party Congress new force was given to the idea that the core of the Party's economic policy at the present stage of the building of communism is a frugal attitude toward the public good and the capability to fully and wisely use everything that we have. The report of the CPSU Central Committee stated that "the goal for the conservation of resources is to more completely and rationally use what the nation possesses. This requires a new approach to many matters in economic management."

The Kemerovskaya Oblast Party Committee is unstintingly implementing this directive. This is particularly important since the Kuznetsk Basin presently is among the leaders in the Soviet fuel and energy balance. At present the Kuznetsk Basin is producing 20 percent of all coal in the Soviet Union. One out of every three tons of metal in the Soviet Union is smelted using Kuznetsk coking coal. Kuznetsk coal is burned in Kemerovskaya Oblast thermal electric power stations to produce 30 billion kilowatt-hours of electric power. At the same time the Kuzbass continues to be one of the largest consumers: every year nearly 74 million tons of conventional fuel is consumed. This includes 45 million tons of coal, tens of billions of kilowatt-hours of electricity and more than two million tons of petroleum products. It is easy to understand why thrift is so important when consumption is so great.

In 1978 the CPSU Central Committee approved the experience of Kemerovskaya Oblast party organizations in conserving fuel and energy resources. Leonid Il'ich Brezhnev highly praised this work in his report to the CPSU Central Committee.

In response to the appeal of the 26th Party Congress - to make the Soviet economy truly economical, the labor collectives of Kemerovskaya Oblast have initiated an extensive competition to raise the efficiency of production and to conserve all kinds of resources in the national economy.



Leading production workers from Kuzbass were the initiators of this competition. These workers were delegates to the 26th Party Congress and their appeal to all workers of the Soviet Union to actively participate in the competition to conserve fuel and energy was in the 1 March 1981 edition of the newspaper SOTSIALISTICHESKAYA INDUSTRIYA. This initiative, which was approved by the oblast party committee, found broad support in the production collectives and among the population.

In order to come up with more effective measures to strengthen the effort to conserve fuel and energy resources, to raise the level of organization and the effectiveness of the socialist competition for conservation and thrift, and to activate the organizational and mass political work at the local level, the party bureau of the oblast party committee organized a check of the state of affairs in all cities and rayons of the oblast. The secretaries and department chiefs of the oblast party committee participated in the check, as did the responsible workers of the oblast executive committee, the oblast trade union council, the Komsomol Party Committee, and the oblast party control committee.

Measures for further improving the organizational and political work of the party organizations in the oblast in conserving fuel and energy resources in the light of the requirements of the 26th Party Congress were discussed at a meeting of the oblast party committee aktiv.

At present oblast, city and rayon party committees, nearly all enterprises, organizations and institutions have drawn up and are implementing five-year comprehensive plans for party-political and organizational-technical measures for making rational use of and for conserving fuel and energy resources.

Particular attention has been given to increasing the production of fuel and energy, to raising the quality of operating the power industry, to improving the existing and extensively adopting new, more effective technological processes and equipment in the power system, and to make fuller use of secondary energy resources, to reduce the amount of materials needed in manufactured articles and to use recycled raw materials.

The realization of the planned program will make it possible to save during the five-year plan more than one billion kilowatt-hours of electricity, 2,600,00 gigacalories of thermal energy, 560,000 tons of conventional fuel, and to cut coal losses in the mines by nearly six million tons.

While carrying out the plans that have been developed for conserving, oblast workers in the first six months of this year have saved for the national economy 185,000 tons of conventional fuel, 145 million kilowatt-hours of electricity, and 300,000 gigacalories of thermal energy.

Quite a few of the oblast's leading enterprises have positive experience in conserving energy resources. The collectives, in which the initiators of the competition work, are a good example.

Taking into consideration that the Soviet national economy is experiencing a shortage of coke, the Kuzbass metal workers are seeking to reduce the consumption of coke in the blast furnaces and in other production facilities. For example, at the West Siberian metallurgical plant this year they have increased the use of natural gas and oxygen in the blast furnaces, which has resulted in a reduction in the use of coke of 80 kilograms per tons of pig iron. They have also adopted a procedure for dosing the lower level of the melting stock during the production of agglomerate, which makes it possible to conserve nearly 6,000 tons of coke per year.

At this same enterprise they have developed and adopted an improved system of material incentives for workers' results in using fuel and energy resources. This system is viewed as paying bonuses for their conservation and as reducing the amount of a bonus for fulfilling planned assignments when energy resources are overexpended.

In the coal industry according to the example of the leading mining brigades they have adopted a pillarless ore extraction process and improved mechanized equipment sets such as the "2UKP", "4KM-130" and others, which will make it possible in 1981 at just the mines in the cities of Leninsk-Kuznetskiy and Mezhdurechensk to produce an additional one half million tons of coal. Improving the technology of the hydro-stripping using hydro-monitors with remote control and the preliminary loosening of rock will provide the production association Kemerovougol' in this year alone a savings of nearly five million kilowatt-hours of electricity.

The installers at the Tom'-Usinskaya GRES, the collective of which is one of the first in the sector to adopt a system of guaranteed repairs, are maintaining constant watch over the operation of repaired equipment throughout the entire warranty period. This is increasing the reliability of the equipment operation. At present the coefficient of readiness to handle the equipment load of the power station has been brought to 92.7 percent. In the first six months to the level of last year the relative expenditure of fuel has been reduced by 2.26 grams per kilowatt-hour. This has resulted in a savings of nearly 10,000 tons of conventional fuel.

The party committee and the board of directors of the aluminum plant have drawn up good comprehensive measures for the 11th Five-Year Plan and booklets for all of the basic professions, made additions to the official instructions, generalized the leading experience of the organization of socialist competition for conservation and thrift, have organized a demonstration of the daily consumption of electricity by the brigades, shifts and shops. A group of plant propaganda specialists from the system of political and economic education has come up with the initiative "every student is a personal account of conservation." This initiative has been extensively disseminated among the

propaganda specialists from the city of Novokuznetsk and the oblast and has induced many students to reexamine the pledges that they have made and with the help of the propaganda specialists they have made their pledges weightier and more economically sound. Already in the first six months the aluminum workers have saved nearly 7 million kilowatt-hours of electricity and reduced the relative expenditure of electricity by 629 kilowatt-hours per ton of metal.

In the execution of the competition and in the accomplishment of the planned comprehensive measures the party committees and local party organizations are relying upon trade union and Komsomol organizations, the peoples' control organs, the scientific-technical societies and the means of mass information. Questions regarding the conservation of fuel and energy and other material resources are regularly examined at plenums and the bureaus of the party committees, and at party, trade union and Komsomol meetings. Coordinating councils on the conservation of resources are operating at the oblast party committee, city party committee and rayon party committee levels.

To keep track of the expenditure of electrical and thermal energy, fuel and other resources at enterprises and in organizations, more than 110,000 personal accounts of conservation have been created, involving more than a half million workers.

In the oblast extensive use is being made of public showings on the preparation of enterprises and organizations for work in winter conditions and for the better use of rationalization proposal and invention aimed at the conservation of fuel and energy and materials. Questions regarding the rational use of resources are submitted for discussion by theoretical and scientific-practical conferences, seminars of the party-economic aktiv and are included in the programs of party and Komsomol training, the economic education of workers, communist labor schools, and systems for raising the skill level of workers.

In teaching thrift we attach considerable importance to specific, purposeful and visual agitation and the use of mass means of information. The mass means of information reflect how the competition is proceeding, propagandize leading experience, and point out shortcomings.

However, the available reserves and opportunities of the Kuzbass to solve the fuel and energy problem, in our opinion, are not being used fully at present. The extraction of coal is increasing slowly and is lagging behind planned rates. In spite of the fact that fuel losses during excavation are gradually decreasing, hundreds of thousands of tons of high-grade coal remain in the mines. This is due primarily to the fact that the operating parameters of the mining and transport equipment do not match up with the complicated mining and geological conditions of the Kuznetsk Basin. The scientific-research and designing institutes must speed up their work in creating excavating equipment, complexes and units, and technological systems for the special conditions of the Kuznetsk coal basin.



In accordance with the party and government decisions regarding the further development of the Kuzbass, the flow of coal from the Kuzbass will increase. For this reason an acute need has developed not only to reduce losses of coal during railroad transport but also to deal with questions about the development and creation of new kinds of transport, particularly pipeline transport.

In the ferrous metallurgy sector one of the main trends in conserving resources is to increase the efficiency of using natural gas in the basic production facilities. In the blast furnace shop of the West Siberian metallurgical plant, for example, it is possible to increase the consumption of natural gas by 1.5 to 2 times with a corresponding increase in the enrichment of a blast of oxygen. This makes it possible to conserve an additional 100 kilograms of coke per ton of pig iron. At the Kuznetsk metallurgical combine they are now using nearly 50 cubic meters of gas per ton of pig iron due to a lack of oxygen. In order to solve this problem and to conserve for the national economy hundreds of thousands of tons of scarce coke, it is necessary to build three KAR-30 oxygen units at the Western Siberian plant and an oxygen pipeline to the Kuznetsk combine. The USSR Ministry of Ferrous Metallurgy could lend assistance in this endeavor.

Increasing the use of recycled energy resources can provide large reserves for conservation. Estimates show that this would make it possible to conserve nearly 300,000 tons of conventional fuel per year.

As before the problem of instituting a standard method of accounting for the expenditure of energy resources remains a serious concern. Everyone is aware that because of poor accounting it is difficult to develop and adopt scientifically sound expenditure norms and to evaluate the energy efficiency of enterprises and to encourage the collectives to participate in the struggle to reduce non-production losses. Unfortunately, we are not able to solve this matter fully because the requests of enterprises and organizations for control and measuring devices and fittings are being filled by only 25 to 30 percent each year.

In some party organizations there are shortcomings in the organizational and mass-political work. Several organizations and enterprises are permitting an overexpenditure of energy and other resources.

Governed by the requirements of the CPSU Central Committee and the instructions of Leonid Il'ich Brezhnev, the oblast party organization, making use of the experience already gained, is persistently working to eliminate existing shortcomings and to improve the forms and methods of the organizational and political work for conserving fuel and energy resources. The decree of the CPSU Central Committee and the USSR Council of Ministers "Increasing the effort to conserve and make rational use of raw material, fuel and energy and other material resources", which is now being discussed throughout the Soviet Union, will make it possible to take a new step forward in increasing the efficiency of public production and to accomplish the decisions of the 26th Party Congress.



## ENERGY CONSERVATION

### ELECTRIC POWER CONSERVATION

Kazan' SOVETSKAYA TATARIYA in Russian 19 Jul 81 p 4

/Article: "Lost Electricity"/

/Text/ "...increase the quality of work among the population to ensure the conservation of heat, electricity, natural gas, and water in everyday living. To strengthen the responsibility of the enterprises and institutions of the housing and municipal services and the general population for the irrational use of these commodities."

(Discussion with the chief of customer services department of Tatkom-munenergo /Tatar ASSR Municipal Services and Power Authority/, K. G. Zaripov.)

/Question/ Kamil' Garipovich, your administration operates the electric power supply for the housing and municipal services of the cities and rayons of the Tatar ASSR. It would seem that the sphere of service to the general population is rather small when compared with the scale of services to industrial enterprises. Does this consume a great deal?

/Answer/ In your opinion, how does this figure sound: 370,650,000 kilowatt-hours? This is how much electric power our consumers received in the first six months of 1981. This does not include the city of Kazan'.

/Question/ That sounds impressive. But on such a scale of consumption the losses require serious attention. Let us speak about the losses. Where, when and how are we losing electric power?

/Answer/ Let us not talk about industrial enterprises, that is a subject for another discussion. I propose that you take a careful walk through a small institution - they also are included among our consumers.

/Question/ Why a small institution?

/Answer/ Do you know who gave us the largest percentage of overconsumption of electricity? Strange as it may seem it was drug stores!

In Al'met'evsk - 32 percent, in Bugul'ma - 23 percent, and in Mamadysh - 15.3 percent. And how many such small institutions are there in the republic?

Question I see. Then let us take a look at a work day in a small institution.

Answer We open the front door and are struck in the face by warm air. Everything is normal, the door is open and the heating ventilator must operate. But the front door slams shut, leaving the ventilator to tirelessly push the heat. It has not been blocked with a mechanism for opening the doors. There is no automatic control that determines the temperature of the air within the facility. I remind you that the ventilator is operated by electricity.

We enter the working area of the store. Beneath the ceiling hang lights under frosted shades. Everything is covered with a thick layer of dust - the light penetrates the dust with great difficulty. The walls are painted with an indiscernible, but very dark color. More than half of the window (which, by the way, has not been washed for a long time) is covered with a shelf for office equipment. Then the table lamps are burning 100-watt bulbs for some reason. They simply are not needed here, and what is more too bright light is bad for vision. There are scientifically based norms. In such a case only 15 watts per square meter are needed. But they know nothing about norms here.

To complete the picture one can add that during the lunch break the lighting system is used to light empty tables.

It is such "trivialities" that lead to losses of electricity.

Question This is a familiar picture, although one does not always encounter it in such a concentrated form. It is also bad that we also keep such habits at home in our own apartment.

Answer For some reason we are very accustomed to wasting electricity. I have an outdated brochure here that lists prices in old money: 40 kopecks per kilowatt-hour. Now a kilowatt-hour costs 4 kopecks. The former price had not changed over a period of several years. But does this really give us the right to be indifferent toward the purposeless consumption of electric power? For some reason it is not easy to speak truisms. How many times has the little placard that says "when you leave please turn out the lights" been the subject of jokes for cartoonists. Everyone remembers that there is one million of us in just the city of Kazan' and that when we leave a room and turn out the lights, we are only one out of a million.

Question Still the overwhelming majority of the inhabitants of the Tatar ASSR are sufficiently serious about conserving electricity. We can see this in the letters to the editor; the letters, which raise this question and give a specific address, come to us fairly often. People are particularly upset by the street lights that burn around the clock, competing with the sun. Steps are taken in response to each such letter. But the question arises: is there a solution to the problem?

/Answer/ Of course. At each enterprise (and not just those connected directly with the supply of electricity) there is a plan for the adoption of new, economical equipment. In speaking about street lighting this new equipment consists of a programmed relay that turns on the street lights when it is dark. During the night half of the street lights are turned off. In other words this amounts to a nearly automatic control of electric lighting. The adoption of such relays is underway in all cities - Zelenodol'sk, Naberezhnyye Chelny, Leninsk, and Al'met'evsk. Sixty percent of all sources of lighting on the streets has already been switched to automatic control.

The inefficient incandescent light bulb will soon be a thing of the past. I am thinking, of course, only about street lighting. I have but one example: the arc lamp. Its flow of light is four times greater at the same capacity - 250 watts. And it lasts three times longer than the incandescent light bulb. Each year we install nearly one thousand such lights to replace the old ones.

The transfer of all electrical devices to a higher voltage - 380 volts - will be very important. Energy losses will be sharply reduced.

/Question/ It is now summer....

/Answer/ This is an example of how a well-thought-out and managed approach to something can produce noticeable results. For our administration alone the plan for the second quarter of the current year was adjusted by two million kilowatt-hours.

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## ENERGY CONSERVATION

### WASTE OF GASOLINE CITED

Frunze SOVETSKAYA KIRGIZIYA in Russian 11 Sep 81 p 2

/Article by V. Ampilogov, chief of the Main State Inspectorate for Rural Equipment of the Kirghiz SSR: "Rivers of Gasoline are Flowing"<sup>7</sup>

/Text<sup>7</sup> In many of the economic organizations of the Kirghiz SSR gasoline is being wasted.

In recent years in the Kirghiz SSR people have been taking a more thrifty attitude toward gasoline. On the average for the plowing of one conventional (standard) hectare they have been consuming 7.7 kilograms of gasoline instead of the planned 8 kilograms. Last year and this year more than 8,000 tractor operators and 3,500 drivers have achieved significant savings in the use of gasoline and lubricants.

This is cause for gratitude. However, in many economic organizations and even entire rayons of the Kirghiz SSR POL products are being used in excess of any measure.

The main reason for losses is that many economic organizations (at times with full knowledge of what they are doing) are muddling the accounting of POL products or are not maintaining any accounting at all. There are many different ways to muddle the bookkeeping. Let us take a look at planned bookkeeping methods. We will examine them through the example of the "40 let Oktyabrya" kolkhoz in Issyk-Atinskiy Rayon. In 1981 at this kolkhoz they planned to increase the transport of cargo by 68,500 ton-kilometers. The farm did not really need to do this amount of work and so it was no surprise when the transport plan was fulfilled for the first six months - by one seventh. The forged estimates were only needed to bring in 200 to 300 more tons of diesel fuel than needed and to have the opportunity to conceal both the misappropriation and the losses and the overexpenditure of fuel.

In the kolkhoz's bookkeeping department one can find several curious documents. For example, two tractors on one day in identical conditions transported an equal amount of cargo. But one tractor was recorded as having used one kilogram of diesel fuel per ton-kilometer and the other used 3 kilograms - (this is 2 and 6 times greater than the norm). Why? This was done so that the books balanced. A truck



driver is paid for driving 37,500 kilometers, when the speedometer registers only 15,600. The "saved" gasoline is enough for his own needs and for his neighbor's private automobile.

Such methods for obtaining excess amounts of fuel and for balancing the books are used in many farms in Dzhety-Oguzskiy Rayon of Issyk-Kul'skaya Oblast and several in Narynskaya, Talasskaya, and Oshskaya oblasts. There are also local "finds" and variations on the theme of the poor attitude toward POL products. For example, at 14 out of 16 kolkhozes and sovkhoses that were checked in Talasskaya Oblast the limits for the expenditure of fuel and oil had not been established at all, and there was no monthly recovery of the remnants. At the "Talas" Kolkhoz in Kirovskiy Rayon and the Sovkhoz imeni Bokombayev and the Sovkhoz "Dzhety-Su" in Toktogul'skiy Rayon the expenditure norm in the travel vouchers of the drivers are entered in liters, but in the bookkeeping department the entries are in kilograms. Since a liter of gasoline weighs less than a kilogram, a "savings" is created at the POL base.

At the sovkhoses imeni Bokombayev (and others) they use a more trite method of deception in maintaining records on the expenditure of fuel and energy resources. For example, driver M. Abdykaliyev received 650 liters of gasoline according to his travel vouchers for the month, but the manager of the POL storage facility cribbed 1,670 liters for his automobile. The garage dispatcher, Arikbayev, from his account according to fictitious crude reports cribbed 11,210 liters of gasoline amounting to 1,681 rubles.

The great responsibility for the safeguarding of petroleum products has been placed upon the regional associations of the Goskomsel'khoz-tekhnika /State Committee for the Supply of Production Equipment for Agriculture/, which must repair and maintain the equipment of the POL storage facilities. However, they are responsible for 120 farms and less than half of the existing gasoline stations.

The associations must fully implement the technical maintenance of the gasoline storage tanks and the mainline pipelines in four rayons of the Chuyskaya Valley - Issyk-Atinskiy, Kantskiy, Alamedinskiy and Sokulukskiy. However, they are doing a poor job of fulfilling their obligations. Out of 190 storage tanks, which require internal cleaning, only one fifth have been taken care of.

As they say, a drop saves a ton. In many farms, as we see, they have not learned to conserve these drops.

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## ENERGY CONSERVATION

### NEW AUTOMATIC METER RECORDS ELECTRICITY CONSUMPTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Sep 81 p 1

[Article by V. Parshina: "Adviser for the Dispatcher"]

[Text] Conservation of electricity begins with calculation of its consumption. The meters which are installed at the enterprises, however, only record it, and naturally, cannot control the electricity consumption pattern. Automatic means of control are needed for this purpose. The "adviser for the dispatcher" has become one of these. It helps to rapidly and accurately make the correct decision of the shop in which the line or unit should be turned off at the given moment. In other words, it guarantees strict control of the dynamics of the load schedule in order to maintain it at the assigned level.

The "adviser for the dispatcher" has been introduced by the colleagues from the laboratory of electricity consumption patterns of the Leningrad Planning-Experimental Section of the All-Union Scientific Research Institute of Planning and Electrical Installation at the Sokolovsko-Sarbayevskiy mining-enrichment combine. There is an active system of collection and processing of information on electricity consumption here. It includes 160 meters with built-in sensitive sensors. They "interpret" information regarding the load, then transmit it to the dispatcher who can be up to 15 kilometers away. The system is 300-fold more efficient than the so-called peak-station. It yields almost 2 million rubles of annual profit. This is achieved, in particular, by the fact that the combine does not decrease its production of ore and pellets even in the hours of a "dip" in the loading schedule of the power system if the "adviser" is used. The power supply of the less important sections is reduced for this purpose, and the work of the production units is not forced.

The automated system for calculating and controlling electricity consumption has also been introduced in Leningrad, at the southern water supply station. An original solution has been used here: the system is connected to the active telephone network. There is no longer any need to lay several kilometers of cables which would have required digging up the entire enterprise territory. The economic effect is R 60,000 per year. But what is most important is that ASUE-160M has guaranteed strict control of the load in the "peak" hours of the power system. "In our systems we are still using semi-automatic regulators," says the head of the laboratory, O. Simonov. "Therefore, the dispatcher, seeing the decrease in the load and making a decision, is still not able to control the correct execution of his command. Only an automatic regulator can help him here. It has been made. Introduction will begin this year. The instrument has great potentialities. It is

capable of controlling the power load not only of the enterprise as a whole, but also of individual production processes in the shops."

The system for controlling the electricity consumption pattern with automatic regulators can even control the operation of individual units which number several hundreds in one shop. When a power shortage develops in the power system, this capability is invaluable. What will happen if the system records a disorder in the established regime? The guilty shop can be fined (the fine is calculated in a 10-fold amount of the cost of a kilowatt), while the personnel can be deprived of a bonus. This is how direct interest of the production engineers in strict observance of the power regime is created.

The laboratory recently tested a prototype of the ASUE based on a microcomputer of the "Eletronika S5" family which was made in the association "Svetlana." Work is underway on an experimental model. The reliability of the system and the possibility of transmitting information to the dispatcher panel of Lenenergo [Leningrad Regional Energy Administration] will be verified on it once more. The area of application of the automated system for monitoring and controlling electricity consumption continues to expand. This is a path for real saving of electricity. The outlays are compensated for quickly. As calculated, the system justifies itself already in the first year of operation.

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## ENERGY CONSERVATION

### MINNIBAYEV GAS PROCESSING PLANT SUCCESSFULLY ECONOMIZES

Kazan' SOVETSKAYA TATARIYA in Russian 7 Jul 81 p 2

[Article by P. Chernov, head of the group of the standardized station of the association "Soyuzneftegazpererabotka": "Economy is the Main Reference Point"]

[Text] The Minnibayev gas processing plant is an energy intensive enterprise. During the 10th Five-Year Plan, for example, the plant consumed over 4 billion kilowatt-hours of electricity, over a million tons of conventional fuel, and about a trillion gigacalories of heat. Based on the requirements in the decree of the CPSU Central Committee and the USSR Council of Ministers "On Intensifying Work for Conservation and Efficient Use of Raw Material, Fuel and Energy and Other Material Resources," the gas processors have decided to radically improve all work for conservation and efficient use of electricity, heat and fuel.

During the 10th Five-Year Plan, the Minnibayev gas processors introduced into production over 220 organizational and technical measures aimed at the economical consumption of fuel and energy resources. As a result, the plant conserved over 178 million kilowatt-hours of electricity, about 44,000 gigacalories of heat and over 43,000 tons of conventional fuel for the state. The plant worked for 2 months on the electricity which had been saved.

If we reveal the components in the success of the collective, then the chief one is an effective and precise system of annual planning of measures which promote observance of the conservation regime. The optimal standards and limits for fuel and energy resources according to their directions and types were planned here, for example, based on the annual and long-term plans. Production microplans, regimes that provide for economical consumption of electricity were developed for each section, shop and unit.

The plant specialists see improvement in the system of metering and controlling consumption of energy and fuel as an effective means of efficiently using them. According to the previously existing plan, for example, the electricity was metered at several dozen points in the plant. It was difficult under these conditions to follow the degree of equipment loading, and consequently, to stably maintain its optimal operating mode. The enterprise power engineers developed a plan for energy supply which made it possible to concentrate all the metering at three main substations. Now the working parameters of all the units were grouped. When metering had been centralized, all the changes in the system of electricity consumption



became more clearly visible and more rapidly controllable. The loading of the power equipment became more optimal.

No technical reconstruction at the enterprise takes place without consideration for conservation of fuel and all the energy resources. During the last five-year plan, the collective took measures to update the cooling system. For example, the heat exchangers were replaced in the third compressor shop for more efficient ones. This made it possible to significantly increase the gas pumping with the same outlays, and consequently, to save the state about 6 million kilowatt-hours of electricity per year.

The work of the Minnibayev gas processors for conservation is distinguished at all levels by engineering maturity and a high measure of thrift. A schedule for turning electric lights on and off in the production rooms and areas has already been in operation at the plant for several years, for example. A definite person in each shop is responsible for the accurate observation of this schedule. According to the calculations of the specialists, through this measure alone the enterprise annually saves about 300,000 kilowatt-hours of electricity. The introduction of a well-thought out plan for operating the water supply circulating pumps in the plant also yields a large saving of electricity.

The plant efficiency experts are the most active force in the collective's approach to conservation and economy. Their contribution in the last five-year plan equalled 11 million kilowatt-hours of conserved electricity. Such innovators of the enterprise as A. Borisov, V. Livanov, A. Farukshin, Z. Nigmatullin, Ye. Garipov and others have a high creative output.

The advances made by the collective to observe the conservation regime are the result of systematic and purposeful actions of the administration, party and trade-union organizations. Intershop competitive inspections for efficient use of energy resources and fuel have been held at the plant for many years in a row already. General plant and shop inspection commissions have been set up to organize and hold these competitions. The practice of holding open party meetings which summarize the activity of the collective to strengthen the conservation regime has been strengthened in the shops and sections.

The enterprise uses a system of economic education in order to disseminate the leading experience in conservation. The leaders of the shops who have achieved the best results for conservation often speak at the courses of the schools of leading experience.

Economic levers are used to attain the greatest effect in conservation of fuel and energy resources. A system of cost accounting, for example, has been introduced in the production subdivisions. It provides for material sanctions for the overconsumption of fuel and electricity above the established, economically substantiated standards.

Active inspection of the fulfillment by the collectives of all the subdivisions of the plans and commitments for conservation of fuel and energy is done by the people's controllers of the plant. Target surprise inspections and checks to find cases of wastefulness in the use of fuel, heat and electricity have become one of the effective forms of educating the people to have a feeling of economy. The active trade union and Komsomol members generally participate in these surprise inspections.

Their results are published in the KOMSOMOL'SKIY PROZHEKTOR, LISTOK NARODNOGO KONTROLYA and the plant large-circulation newspaper LENINSKIY PUT'.

The means of graphic propaganda make the price of each kilowatt of electricity and each ton of fuel known at the plant. There are many posters in the shops which graphically reflect the achievements and the tasks of the plant workers in economy and conservation.

The Minnibayev gas processors plan to successfully fulfill the assignments of the 11th Five-Year Plan in close association with the broad struggle for conservation of material resources in all production links.

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## ENERGY CONSERVATION

### ENERGY CONSERVATION PROBLEMS AT CEMENT ENTERPRISE OUTLINED

Moscow PRAVDA in Russian 14 Sep 81 p 2

[Article by Mikhail Vasin: "Cement and Energy"]

[Text] Glow in Gray Flowers

This childhood impression is memorable even today. There is a flower bed in the area of the plant building. Some kind of fantastic flowers with gray leaves and petals have died in it in the hot still air. I only guessed many years later that this strange flower bed, like from a sad fairytale, was located near a cement plant.

It is easy to guess from the whitish dust that forms balls above the road, and covers the trees and grass that you are nearing this type of enterprise. Over 2 million tons of finished product fly away on the wind every year.

This sector is also not very economical in relation to fuel. It occupies one of the leading places in industry in consumption and losses of energy. If the heat leaks were made visible, and the infrared radiation was transferred to the red region of the spectrum, then the gray flowers would begin to glow.

The specialists see this invisible glow very well, by the way. For decades the engineers and scientists have been trying to put the cement industry in the framework of economy and to bring it up to par with our times in other indicators (working conditions, production efficiency, automation). A lot has been accomplished. Devices have been made which prevent emission of dust clouds into the atmosphere. More mechanisms are appearing. Working conditions are improving and certain enterprises are already inviting specialists in industrial aesthetics.

But the main concern of recent years has been energy conservation. The field of activity is the broadest here. Strict observance of the production discipline, maintenance of equipment in good working order, and the proper skill of the personnel are the way to annually save many hundreds of thousands of tons of fuel. The efforts of the branch scientists have been aimed at improving the units and devices, and even individual assemblies in the production lines so that outlays are reduced and heat wastes are diminished. Improved designs are being developed for burners, gas burners, heat exchangers, coolers, chain screens, and the potentialities of separate thermal treatment of the charge are being studied, and much more. The State All-Union Scientific Research Institute of the Cement Industry believes that all of these improvements will make it possible to save 15% of the fuel. On the branch scales, this is over 3 million tons per year.

If heat of the molten metallurgical slags is successfully used to produce cement, press filters are used to reduce the moisture content of the intermediate product to be roasted, and the thermal insulation of the furnaces is improved where they lose 8-14% of the energy through the housing, comparable to 2-3 million tons, then a significant additional saving can be obtained.

#### Pouring Water into the Furnace

The changes for the better are not very noticeable on the background of those heat losses which have taken root in this sphere of industry during the over 100 years of its existence. This is understandable. The continuing searches of the engineers and experiments of the scientists now only result in the fact that individual production operations, equipment and devices are improved from decade to decade. The technology itself remains the same. The original materials have to be extracted, limestone and clay (or marl which contains both), ground in a wet condition, more water added, and then thoroughly mixed. The mass which is formed, similar in consistency to liquid sour cream, is loaded into two enormous rotating furnaces two football fields in length. Natural gas, mazut or coal is burned and as the raw material advances from one end to the other, it dries, is roasted and becomes a fundamentally new material, clinker, essentially finished cement. It merely has to be cooled, ground once more, mixed with certain additives, and sent to the storehouse for finished products.

A lot has changed during the existence of the cement industry: the raw material, the crusher and mill, the sludge-mixing tanks, and the shaft furnaces have been replaced by rotating horizontal furnaces, but the ancient technological base with its built-in wastefulness of heat remains invincible.

The scientists decided only in recent years to tackle this industrial anachronism by attempting to significantly change the process of cement production.

The specialists of the Tashkent Scientific Research Institute of Construction Materials Planning found that if certain chemical additives are introduced into the intermediate product, then roasting, clinker formation, will occur at a much lower temperature than now, and will require 20-30% less fuel. This development of the Soviet scientists has been acknowledged as a discovery and is now being verified in semi-industrial conditions.

The colleagues from the mentioned Moscow institute of the cement industry are conducting experiments with high-temperature jet mills. Particles of crushed raw material are accelerated to supersonic velocity and collide with each other. This not only results in self-grinding, but also implements another important production process, partial decarbonization of the material. Since in this case there is no need for grinding, drying and preparation of the charge, the energy outlays and metal consumption of the process can be reduced by 15-20%.

The scientists from the institute Giprotsement [All-Union State Planning and Scientific Research Institute of the Cement Industry] (Leningrad) jointly with the nuclear physicists chose a third, basically different path. They irradiate the crushed raw material with a stream of electrons. Furnaces are not needed in this case.



## An Old Innovation

No matter how enticing the technological developments of recent years are, we are far from their production realization. A number of specialists are skeptical about the qualities of "low-temperature" cement. The Tashkent researchers have to prove the groundlessness of these doubts. The "jet" and "electron" methods raise even more questions. This is quite natural. The Muscovites are only building a semi-industrial unit, while the Leningraders are building an experimental unit, that is, are even farther from production.

Will the ancient technology thus be unshakable as before? Yes and no.

The fact is that technology does exist which no one questions. Almost all the plants in France, the FRG and Japan are already running on this technology. The industry of the United States and many other countries is beginning to turn to it.

It is curious that this innovation, so-called dry method of cement production, has been known for a very long time. It seems that the cement industry began with this method. It subsequently began to be displaced, and has already been almost completely displaced by the "wet" method. It has a lot of advantages: the extracted raw material does not have to be dried (it contains 10, 20% and more moisture), and by adding water to the crushed components, they can be mixed better. It is easier to correct the composition of the mixture (the quality of the cement depends on this), and it is more convenient and easier to transport the liquid mass within the enterprise using pumps and pipes.

Time passed and everything changed again. The wheel of the history of the cement industry suddenly rolled backwards, accelerating its backward movement from year to year. The cement plants began to re-equip for the "dry" method one after another. The "wet" method is being recognized as outdated more often.

What is happening and in the name of what?

It is happening in the name of reduction in energy outlays. The "dry technology" makes it possible to immediately reduce the fuel outlays for the fabrication of cement sharply, a minimum of 1.5-fold, and without many years of scientific developments. This is primarily accomplished by the fact that no water is added to the intermediate product. It is appropriate to clarify here that in the "wet" method, the material that is loaded into the furnace contains 35-40%, and in individual cases, 50% moisture. Its evaporation uses almost half of the heat released by the fuel.

New trends have not passed by our cement industry. Small "dry" furnaces were started up several decades ago at the Spasskiy plant. Then units that were larger and more advanced in a technical sense were developed. The branch officially adopted a course towards "primary development of producing cement by the more advanced and economical 'dry' method" in the early 1970's. The enterprises of the USSR Ministry of Construction, Road and Municipal Machine Building began to master the production of high-output "dry" lines with output of 3,000 tons of clinker per day.

In a word, a lot, and what is more important, versatile experience has been accumulated to advance the cement industry in the selected direction.

## On Dry Land as on the Sea

But the "wheel of history" which had so actively turned towards the "dry" method, for some reason lost its momentum, and began to turn around, creaking and unwilling. In almost the last decade, only five of the eight finished powerful furnaces were put into operation. Three are still waiting their hour. The machine builders who consider the period of assimilation of new equipment production to basically be finished, announce their ability to supply up to 10 production lines annually. However, they are not receiving orders for this equipment. The percentage of cement that the branch produces by the "dry" method fluctuates between 14 and 15%.

Very competent specialists of the USSR Ministry of the Construction Materials Industry do not give a clear answer to the question of how many plants it is currently expedient to switch to "dry" production and how many years this will take under the most favorable circumstances. At the same time, over 100 rotary furnaces have low output and do not justify themselves. About 30 are designs from the distant past, shaft furnaces. Even mass reconstruction of the branch would apparently take more than a decade. If you sail without a steersman...

The cement industry, after similarly investigating the old innovation as it should, was very disappointed. Why? Perhaps the "dry trend" did not justify the hopes of energy saving? This faint note sometimes creeps into the conversation of the ministry workers. But it is clear from the reports that the best collectives (say, the Novospasskiy plant, where they have used many years of experience of operating small "dry" furnaces), still traversing the new road uncertainly, are now conserving 40-50% of the fuel as compared to the average branch indicators. We recall how the scientists dreamed of saving 15-20%!

Did not the equipment productivity drop, and its metal consumption soar? Our popular "wet" furnaces which have become "classic" have a diameter of 5 meters, length of 185 meters and yield 75 tons of finished product per hour. The dimensions of the latest "dry" furnace that is under construction in Krivoy Rog are respectively 4.5 and 80 meters, while the rated output is 125 tons.

Perhaps the new equipment has shortcomings? The machine builders take this reproach, but are confident that it will be easy to eliminate the technical omissions in cooperation with the operators. A guarantee can be the fact that the cement workers have no claims against the "classic" "wet" furnaces they produce.

Is there a shortage of the necessary raw material? According to the data of a survey made by the Giprotsement institute, 70-75% of the cement plants operating in the country have a suitable raw material base.

In order to consider and weigh all the possible doubts and objections regarding the energy-conserving technology, we will add that it not only does not contradict the latest developments of the scientists, but even meets up well with them. It may receive the impetus for further development because of new scientific trends. It does not lose the advantages of the "wet" method. Good mixing of material, the necessary precision of component dosing, and high quality of cement are guaranteed. The old technological principle has returned to us, not in the past primitive form, but in the most advanced technical attire which requires a much higher level of skill, discipline and responsibility from the personnel than today, and precise operation of all production links. Is this not the main reason for the disillusionment of the production engineers?

One thing is clear no matter where this method is used: the cement industry can no longer avoid this ancient innovation, it has no other path to the future. It has to improve production efficiency, train personnel in the new method, and plan reconstruction of the enterprises in a well-thought out, purposeful and timely manner. Life will demand it. It cannot happen that the branch sails at the will of the waves in terms of energy consumption, nor that in 1, 5 or 10 years every 5-ton truck with full load cement continues to carry another sixth, invisible ton, the fuel which is mainly spent to warm the gray flowers in the flower bed and the neighborhood of the enterprise.

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## ENERGY CONSERVATION

### AUTOMATIC REGULATION OF HOME HEAT SUPPLY NEEDED

Moscow IZVESTIYA in Russian 28 August 81 p 3

[G. Alimov: "Automatic Machines Save Heat"]

[Text] It often happens that it is warm weather outside, sunbathing weather, while at home you do not go near the radiators because they are "blazing." Our quite justified surprise and indignation knows no end. No casement windows save us, we are forced to open the windows wide. The boiler house is running. It is generously heating the houses, and of course, the street.

We usually encounter this inconvenience and wastefulness in spring and fall when the air temperature fluctuates drastically. It is precisely at this time that regulation of the heat supply causes a lot of trouble and the losses are especially great.

We will make a small digression in order to understand why this occurs.

The heating engineers have a classic schedule for supplying heat to the apartments. It has been worked out for years. The quantity of heat supplied to heat the houses must change depending on the temperature of the outside air. In this case, the temperature of the hot water which is supplied for household needs must constantly be at a 60° level. But this schedule operates faultlessly only for a certain time and no longer. More precisely, to a temperature of 2.5 degrees of heat. If it is 3° higher outside, then the heat distribution is no longer regulated. The temperature of the water used for heating "is frozen" and maintained in limits of 70°. Otherwise the temperature of the hot water which is intended for showers and washing dishes is reduced. The sanitary standards do not permit this. It is this seeming trifle which causes these inconveniences in the spring and fall, and tons of valuable fuel to be burned in vain. Can these losses be avoided?

"There is a way," says the deputy head of the fuel and energy administration of the Moscow city soviet of workers' deputies, M. Lapid. "As shown by the experience of automating the central heating stations in Moscow, fuel consumption can be efficiently regulated."

About 100 central heating stations have already been automated in different regions of the capital. Even by the most cautious estimates, this will help to save 500,000 rubles of fuel per year.



The regional thermal station "Krasnyy stroitel'" is one of the largest in Moscow. It supplies heat to the young, rapidly developing region of the capital with the same name. The station does not differ particularly from dozens of others. It is spacious and clean. There are enough automatic machines here. In short, it is a modern station. A number of central heating stations have been connected to it, sort of "transformers" of stations. From 5 to 10 houses have been connected to each of them. Hot water for heating is supplied from the boiler house to the central point. From here, part of it goes directly into the radiators of the apartments, while the other part warms up the cold water for hot water supply.

"It has already been a year," says the head of the station V. Gavrilov, "since we began to install regulators with an electronic head instead of the mechanical regulator at our central heating stations. By the way, this was thought up in the last century. Depending on the weather, this, it should be said, very wise instrument flexibly controls the heat supply. It issues exactly as much heat as is needed. A sensor installed on the outside of the station follows the weather change."

I have had the occasion to be at a number of thermal stations in Moscow. Automation is going full speed everywhere. This is only the beginning, though. A lot of forces and resources have to be invested in order to equip all the thermal stations of the capital with these instruments. Other cities also need automation of the heat supply. The decree of the CPSU Central Committee and the USSR Council of Ministers "On Intensifying Work for Conservation and Efficient Use of Raw Materials, Fuel and Energy and Other Material Resources" obliges strict observance of the optimal production regimes and reduction in all losses of types of energy and fuel.

"Unfortunately," says the deputy chairman of the Moscow city soviet of workers' deputies B. Nikol'skiy, "the broad introduction of systems of automatic regulation is being held back by a shortage of regulators, actuating mechanisms, valves, sensors, fittings and pumps, as well as by their incomplete supply. In addition, the shortage of instruments and means of regulation has forced the planning and operating organizations to develop plans for automation, based on general industrial regulators. In a number of cases this has resulted in insufficient reliability and efficiency of the automation plans. The Ministry of Instrument Making, Automation Equipment and Control Systems, the Ministry of the Electronics Industry, the Ministry of the Electrical Equipment Industry, and the Ministry of Chemical and Petroleum Machine Building need to set up output of the necessary quantity of instruments and automation equipment more quickly. We are not the only ones waiting for them, they are waiting throughout the country."

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## ENERGY CONSERVATION

### ELECTRICITY WASTE CITED IN RURAL BELORUSSIA

Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 81 p 22

[Text] How is electricity used in the village? What is done to conserve it in the kolkhozes and sovkhoses of the republic? How are the enterprises and organizations of the Belglavenergo controlling its expenditure? The check made by the workers of the republic committee of people's control showed that the workers of the main production association of power engineering and electrification of Belorussia are not following the activity of the enterprises and organizations under their jurisdiction very strongly. They permit poor management, waste and even miscalculation of the rural electricity consumers. With accounts of 1,119, the kolkhozes and sovkhoses have recorded 450,000 rubles for electricity, supposedly spent for street lighting. At the same time the lighting does not operate or operates partially in the majority of farms. In the Mogilevskaya Oblast, for example, the streets are lit up in less than 10 percent of the villages.

What are the leaders of the enterprises and organizations of Belglavenergo doing? With their consent the agricultural consumers are responsible for over 10 million kw-h of electricity losses that were allowed because of their own poor management. In this case hundreds of thousands of rubles were fined from the kolkhozes and sovkhoses.

Thus including the electricity that was not delivered but was paid for by the customer in the accounts, the enterprises of the energy system have created a visible well-being, have been included among the leading workers and undeservedly received bonuses.

The decree adopted by the Belorussian Committee of People's Control has obliged the head of the Main Production Administration of Power and Electrification of Belorussia G. Khartanovich to eliminate the shortcomings and to hold strictly responsible the officials who have not provided the proper organization of accounting of the electricity received by the agricultural consumers, and who have allowed additions to the accounts. The illegally paid bonus was fined for a 3-month period from the personnel, and the monetary sums attributed without substantiation to the accounts of the kolkhozes and sovkhoses were also returned. It has been suggested that the corresponding changes be made in the statistical accounts.

The chief engineer of Belglavenergo L. Cherepko was reprimanded. A strict reprimand was given to the deputy head of the Belglavenergo for economic questions M. Slizhevskiy. He was given a monetary fine of a month's salary.

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## ENERGY CONSERVATION

### ELECTRICITY CONSERVATION URGED AT WORK SITES

Kazan' SOVETSKAYA TATARIYA in Russian 19 Jul 81 p 4

[Article by I. Vafin, chief engineer of the "Energosbyt" administration:  
"Advertisement in the Night"]

[Text] "Radically improve all work on conservation and efficient use of raw material, materials, fuel and energy in all links of the national economy."

The decree of the CPSU Central Committee and the USSR Council of Ministers calls upon us to re-examine the formed views on economy. Each line of it is penetrated with an economical and thrifty attitude to material resources. In the final analysis, the welfare of each of us and the condition of our environment depend on the efficient use of these resources.

Our republic is doing definite work in this direction. During 6 months of 1981, the industrial enterprises of the republic conserved 150 million kw-h of electricity. This became possible primarily because of the introduction of 1216 special organizational and technical measures. The production associations "Organicheskiy sintez," "Tasma," the plant "Polimerfoto," the Al'met'yevsk administration of drilling operations have achieved the best results. The collectives of these enterprises have been awarded prizes in the socialist competition. Good results have been obtained where the economic leaders, party, trade union and Komsomol organizations are conducting this work purposefully and daily.

But there are other facts, unfortunately. One hundred seventy-seven examinations and 59 surprise inspections were made this year. Their task was to reveal and eliminate all cases of inefficient consumption of electricity. As a result, 103 acts of wastefulness were sent to the committees of people's control, and 137 acts to the administrative commissions of the rayon ispolkom. These figures force us to think seriously.

Surprise inspections were made in May and June from 03:00 to 06:00. Natural lighting is quite sufficient at this time. Nevertheless, all the lights were on at 22 industrial enterprises. The buildings of eight institutions were lit up. It is not known who the advertising rainbows were all lit up for at 15 trade enterprises.

All the leaders of these enterprises and institutions have been warned, of course, and information of some of them has been sent to the committees of people's control. But it seems that these figures should draw more than their attention.

Each of us knows that the miners and oil workers, transport workers and power engineers expend a lot of work to generate electricity. But it is not enough to just know this. The party's requirement that the economy must be economical must be realized daily and hourly, at each work site.

## ENERGY CONSERVATION

### ENERGY CONSERVATION IN KAZAN' CHEMICAL COMBINE

Kazan' SOVETSKAYA TATARIYA in Russian 19 Jul 81 p 4

[Text] "Raise the exactingness of the leaders, engineers, designers, planners, production engineers and other specialists to develop and introduce new equipment, the most advanced production processes and other solutions which guarantee efficient use and conservation of resources with a high quality of products."

The correspondent of MOZAIK converses with the chief power engineer of the Kazan' Chemical Combine imeni M. Vakhitov, P. N. Prokof'yev .

[Question] Petr Nikolayevich, the most attention is now being focused on conservation of energy and other material resources. Confirmation of this is the recent decree of the party and government. Please tell us how this work is being done at the combine.

[Answer] We are trying to keep these questions under unremitting control. I will cite one figure for information: the combine saved 977,000 kw-h of electricity in 1980. Our enterprise entered the ranks of the best in the RSFSR Ministry of the Food Industry because of this indicator. The service of the chief power engineer develops an annual plan of organizational and technical measures. To search for reserve of conservation of all types of resources, we enlist production engineers, engineers and workers of the control and measuring instruments shop.

[Question] So that all that has been said is graphic, dwell in more detail on one of the efficiency expert's suggestions.

[Answer] Certainly. Circulating water supply was introduced and the deep pump in the well was replaced in the candle shop. It was thus no longer necessary to take water from Lake Kaban. The suggestion made it possible to reduce the consumption of clean water. Its pumping had annually required 100,000 kw-h of electricity. It should be said that it was a long way from the idea to introduction. All the combine services were involved: builders, electricians, sanitary engineers, and of course, the subcontractors. Installation of the shaft and three centrifugal pumps was done in the shortest time because the trench could collapse. But now all the work is behind us. Our well operates and very efficiently. We believe that this is our small victory, our contribution to the struggle for conservation of energy resources.

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## ENERGY CONSERVATION

### DELAY OF AIRPLANE FUEL SUPPLY CITED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Sep 81 p 1

[Article by Yu. Korolev, head of the department of fuel and lubricant materials service of the Tyumen' administration of civil aviation: "Fuel Is a Dry Ration"]

[Text] There is no more reliable a winged freight carrier for the northerners than the AN-2 airplane. At one time this airborne all-purpose vehicle brought the geological prospectors of Yamal, the builders of the cities and workers' settlements of the Tyumen' polar region to their production and supply bases.

The volume of freight shipped by small aviation is fairly great. This year, for example, the "annushki" should supply 2,000 T of meat and 5,000 T of Siberian fish to Bol'shaya Zemlya. Understanding the importance of this task, the Ministry of Civil Aviation has allocated to us the necessary funds for gasoline. However, funds are funds, and it is quite possible that we will have nothing to refuel the planes with.

We have persistently reminded the head of the Tyumen' administration of the RSFSR State Committee for Petroleum Products V. Akimov of this from the very first days of short northern navigation. He is responsible for fuel shipment. He has calmed us: "There is plenty of time."

It was found at the end of the second quarter that less than half of the planned quantity of gasoline for the AN-2 airplanes had been delivered to the northern airports. The reason? It is always "objective" for the suppliers. They say that there are not enough railroad cars in Kambark to ship fuel to Omsk.

Seeing that we could not get any sense out of Comrade Akimov, we turned to his supervisor, we went directly to the chairman of the RSFSR State Committee for Petroleum Products T. Khuramshin (several days ago Talgat Zakirovich headed the union committee of petroleum products). What happened? We were again assured that measures would be taken! They "took measures": in July slightly more than half of the planned gasoline for the month was shipped, and in August, not a single gram!

The deputy head of the Main Administration for Traffic of the USSR Ministry of Communications V. Klyucharev also answered the alarming signals of the pilots with empty promises: there were not enough railroad cars at the refueling base as before. Although everyone has an excellent understanding of the great and important work that small aviation does in the north, these comrades do not care for our troubles.

Can the situation still be corrected? Yes it can. There are about 2-3 weeks reserve. If we lose time, then we will have to use the MI-8 helicopters to export deer and Siberian fish and to supply all that is necessary to the workers of the north who will soon be cut off from the supply and production bases by thousands of kilometers of snowy tundra. This is economically inefficient: 1 hour of flight of the AN-2 uses up almost one-fifth less fuel than the helicopter. It is easy to compute how much it will cost if we are forced to use helicopters everywhere in the fall-winter period where the unpretentious "annushka" can successfully operate.

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## ENERGY CONSERVATION

### BRIEFS

**LIGHTING NORMS**--Do you know that the operating life of each standard lamp with its rated voltage is 1000 hours of continuous burning. However, in the rural areas, the voltage in the circuit is changed very often, and then, for example, the lamp which is rated for the 215-225 V range burns out much faster in a circuit with voltage of 230-245 V. How is this? Find out in the regional department of the city power system administration management the actual circuit voltage in your house and buy lamps which are rated for this voltage. Lamps of increased voltage are sold in the household stores of the consumer's cooperative. [Text] [Minsk SEL'SKAYA GAZETA in Russian 15 Sep 81 p 4] 9035

**SUMMER HEATING OF BUSES**--The memorandum "Why Is There a Sauna in the Trolley Bus?" was published in No 28 of the weekly. It stated that the Leningraders sometimes travel in heated trolley buses in the summer. "The question was correctly raised," answered V. Bal'zamov, chief engineer of the plant imeni Uritskiy (Engel's of the Saratovskaya Oblast) to the editorial staff, "The services of the trolley bus administration in the city create a sauna in the buses." As V. Bal'zamov explained, all the trolley buses are equipped with a fan cooling system. Depending on the position of damper in the "winter-summer" switch assembly, the hot air escapes either into the bus, or into the air. At times, this damper is not installed in the right position. We thus now know that they do not install it in the right position, but why do they? The trolley bus administration of Leningrad unfortunately is not hastening to answer this question. The main trade administration of Mosoblispolkom [Executive Committee of the Moscow Oblast Soviet of Workers' Deputies] examined the letter "Where Can Lamps Be Bought!" (EKONOMICHESKAYA GAZETA, No 19). A lack of electric lamps for sale in Serpukhov with power of 15 W actually occurred. The head of the main trade administration of the Mosoblispolkom L. Chizhkov has reported that 15-watt electric lamps have already been shipped to the trade network of Serpukhov, and the supplies of 25-watt lamps have been supplemented. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 36, Sep 81 p 15] 9035

**ELECTRICITY CONSERVATION**--The collective of the Ali-Bayramly administration of drilling operations has already saved over 2 million kw-h of electricity this year. A lot of credit is due the brigade of electricians headed by engineer Siyasat Melikov. By skilfully using the leading electrical equipment and continually improving labor organization at the boreholes, the electricians were able to significantly reduce energy losses during its distribution and consumption. The net cost of the distribution operations was diminished a lot. The electricians Gasan Zeinalov, Feyzulla Gasanov, Yusif Farkhadov and others are working especially well these days. They have decided to double the conserved quantity of energy before the end of the year. [Text] [Baku VYSHKA in Russian 22 Aug 81 p 1] 9035

ENERGY CONFERENCE--Mechanisms and devices which use electricity are encountered at every step. This dictates the urgency of the problems being discussed at the first all-union scientific conference on the topic "Decrease in Losses in Electrical Systems" that opened on 30 September in Baku. Organized by the USSR Ministry of Higher and Secondary Specialized Education, it is taking place in AzINEFTEKIM imeni M. Azizbekov. Representatives of VUZ's, scientific research institutes and enterprises of Moscow, Leningrad, Kiev and other cities are participating in the work. The conference was opened by Professor of the Moscow Power Engineering Institute, Lenin Prize laureate V. A. Venikov. He talked about the work being done in the USSR and abroad which will not only permit a saving of electricity, but also will increase the reliability of the systems by simultaneously decreasing the metal consumption. Academician of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin I. A. Budzko, Professor of the Ural Polytechnical Institute D. A. Arzamastsev, colleague of the Institute of Electrodynamics of the Ukrainian SSR Academy of Sciences Professor L. V. Tsukernik, associate professor of the Moscow Power Engineering Institute O. A. Kos'kin reported on the methods of reducing nonproductive expenditures of energy in the agricultural circuits, the optimal regime for rating energy systems, and control of energy losses in municipal electric transportation. The work of the conference will continue in three sections, where the participants will discuss about 200 reports and papers in 4 days. [Text] [Baku VYSHKA in Russian 1 Oct 81 p 2] 9035

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